Prosperity Is Still with Us

THE first six months' business of 1923 are finished. The record is conspicuous. They are six months of splendid business! In one particular alone, the business of these past six months stands out in record-breaking figures. The carloadings in May equaled the peak carloadings in October, 1920. In other words, the spring of 1923 we loaded as many cars as we did in the fall of the tremendous year of 1920, which many operators and prophets of the market thought would never be equaled for years to come.

This record business for the first six months of 1923 is the forerunner of heavier and increased business for the last six months of the year.

During the first three months of this year there was some justified anxiety on the part of bankers and economists that a secondary inflation might ensue this year, but in April, May and June the ultimate consumer, knowing the tendency to mark up wages and commodity prices, expressed his disapproval by withholding orders from the market. This was very wise and has had a most salutary effect, for it has prevented any accumulation of stocks of unsold commodities, and assisted in keeping the market in a healthy condition.

The continuous heavy loadings of general merchandise every week up to the present time is an evidence of the fact that even though the ultimate consumer continues to buy goods only as he needs them, his purchases are sufficient to keep a big volume of prosperous business on the market.

Labor is an essential factor in the situation. It is generously employed at remunerative wages. There is plenty of work for those who will. And with the harvesting period on, and good crops in prospect, no man need be out of work at good wages who wants to work. The purchasing power of the country never was larger. The opportunity for savings over and above living expenses never was better. General thrift of the people of the United States was never more apparent, and the indications at this writing are for peak business during the fall months and prosperous returns for all.

The ultimate consumer is the boy to reckon with. His confidence may be captured by stable prices and stable conditions. The balance in industry is here. The volume of business is obtainable. Bank credits are ample and the financial situation is sound. The psychology has been a bit wobbly for the past two months, but a pessimistic psychology cannot, at this stage, overturn nor change the factor of real, actual, healthy prosperity that exists pretty generally and, with few exceptions, in industry and commerce in the United States.

What Factors Do Paper Mills Consider When Buying Felts and Jackets?

Does Service Count?

Most assuredly it does—if time and efficiency are business factors. Appleton Felts and Jackets have built up a nation-wide reputation for dependability. They surely render service plus.

Does Quality Count?

Every good business man knows it does. You will never get very far unless you take advantage of quality materials and methods to produce quality products. The size, the weight, the material and the workmanship of Appleton Felts and Jackets are guaranteed. Only Pure Wool, spun and woven by the most skilled American workmen, is ever used in their making.

Does Economy Count?

Nothing is more essential to success. Unless you watch the little things, you will never reach the goal of big ones. If Appleton Felts and Jackets were not most economical, do you imagine for a moment we would have continued for 32 years to supply the demands of America's leading mills?

If Service, Quality and Economy count with YOU, write us for facts and figures showing how Appleton products can serve you. The harder you are to please, the better Appleton customer you will become.

APPLETON WOOLEN MILLS
Appleton, Wisconsin

Appleton
Felts and Jackets

A Summer Thought

"CONSIDER the lilies of the field, how they grow; they toil not, neither do they spin: and yet I say unto you, that even Solomon in all his glory was not arrayed like one of these," is a scripture passage which is probably as seriously contemplated during the warm months of summer, when all nature is aglow with the beauty and splendor of blossom time, than at any other period of the year. After months of labor and strict adherence to the duties of our respective tasks, our attention is arrested by the display of summer and we listen to the call of the warm winds and brooks and give heed to the beckon of forests and flowery fields. We look upon this order of nature and viewing it in the fruition of all its fondest hopes, that of expressing itself completely in the manner for which it was made, we wonder and think why it is that man should not be so provided; that seemingly without work and effort, but simply relying upon a Divine order of things, our hopes and expectations should not be so fulfilled and our food and raiment be so supplied. Do we realize that the plant lives for just one purpose, that of expressing itself in as beautiful and useful a way as it is intended? And do we so live?

Mankind was created for social and active life. Men were made dependent on each other for the reason that this very thing constitutes the strongest tie of human society. To be useful members of the latter, we must continually endeavor to add to the common stock of knowledge and understanding, and as thinking in any direction is the beginning of activity, right thinking linked up with the action to suit the thought is the very source of man's usefulness.

The lilies are arrayed gorgeously as a result of their obedience to the laws of nature. Is it not right, then, to expect that man should be endowed with his inalienable rights as a result of his obedience to the law of giving to our utmost the best that is in us?

The paper industry is in need of constructive work. Problems beset it which threaten its economic growth and development. One would say that our talents have been given to us; it is up to us now to make the most out of them. With the ever decreasing supply of raw material, the rising standard of wages, and the market price as high as the consumer can pay, the future success of our industry lies in the reduction of manufacturing costs by the elimination of waste, the utilization of woods and plants which have not yet been found practical or desirable, and the finding of new markets for the product.

The talents of a skilled paper maker are required to be ever higher as time goes on. The one who keeps abreast in the race by improving his time in the accumulation of knowledge will ultimately succeed in his chosen vocation.

It has been said that a man is lazy who will work as hard as can be with his brain and hands solely on the task which has been set before him and neglect to study for his own advancement, or let himself be heard when he has an interesting and constructive suggestion to make which might improve his employer's business.

Our success is provided through obedience to the law of progress, which demands that we make use of the talents that have been given to us, by right endeavor in the improvement of our own position, and by expressing ourselves in a constructive way for the betterment of the industry which employs us.

Oxford Paper Company

Mills at
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Executive Offices
200 Fifth Avenue
NEW YORK

Manufacturers of

High Grade Machine Finish and Super-Calendered Book, Lithograph, Envelope and Tablet Papers

and

"Polar," "Hi-Tone" and "North Star" Coated Book Papers; also Coated One or Two-side Lithograph and Cover

Capacity of Mills: 350 tons of Paper, 150 tons of Soda Pulp, 100 tons of Sulphite Pulp per day

THE PAPER INDUSTRY

REG. U. S. PAT. OFF.

Vol. 5 JULY, 1923 No. 4

Do You Paste Papers?

By JAN VAN UITWERKING

PURELY for reasons of convenience and ignorance of exalted literary style the following article on pasting contains perhaps oftener than necessary the pronoun "I," or to quote the American Universities New Unabridged Dictionary, "the nominative case of the pronoun of the first person; the word by which the speaker or writer denotes himself."

My native modesty battled for a long time against the use of the word "I"—the writer denotes himself—but since the article contains my personal experience, obtained through hard work, sleepless nights and many knocks, I finally considered myself entitled to speak in the first person.

Just a few years ago I landed in New York from my native land, Holland, via steerage and Ellis Island. Over there I had been a paperhanger's assistant and also a reel boy for a period of more than ten years. After buying several blocks of oil stocks with my last few dollars, and with no lodgings or credit, I had to look for a job, or, to use the more refined language of my college days, "to seek a position." I did not find the latter, but an acquaintance (I called him a friend before he secured the job for me) told me that I could have a job in a pasting plant somewhere in New Jersey. He asserted that my expert knowledge with the European paper trade and my expert knowledge of starches and pastes would go to make up just the right combination for the job.

Consequently I was introduced to my new boss and the pasting machines and "then the fun began."

The plant which secured my invaluable service did job pasting and was, therefore, at a great disadvantage, as it had to take the papers just as they were made by the customers. In many cases the customer did not take into consideration that papers intended for the subsequent process of pasting, should receive quite different treatment in the manufacture, in order to obtain a perfectly pasted stock at maximum output and minimum waste. Especially high grades of loft dried papeteries or ledger papers, highly sized and with edges all cockled or wavy, or papers containing chemicals retroactive to paste, caused endless troubles in pasting. Occasionally loft dried papers had been hung too thick on the poles and the process of drying therefore uneven, so that the part of the sheet covering the pole was badly sagging. Naturally the pasted stock was also sagging and thus rendered unfit for its intended use.

Sheet Pasting

It is quite logical that loft dried papers should be thoroughly seasoned (conditioned) not only after they have been taken from the loft, but also after they have been reversed. I found that a seasoning period of from eight to ten days is entirely sufficient between the time of coming from the loft and being reversed. Whenever possible the seasoning period should be extended as much as possible. The paper must be weighted down during the period of seasoning to the highest degree of flatness.

The reversing itself is to be done with great care, as it is essential to always have the felt side on the outside of the pasted sheet. Particularly papers for subsequent vellum or plate finish must be reversed under any circumstances. Although in papers afterward plated linen finish, any possible wiremarks would be obliterated by the process of plating, it is advisable to also reverse these papers.

After reversing the paper should be seasoned for two or three more days before it is taken to the pasting machine.

The wet pasted stock is to be put into the hydraulic presses in piles of twenty-eight to thirty inches high and subjected to a pressure of 90 to 100 tons for a period of twenty to thirty minutes, according to the grade of paper. During the pressing the pasted stock is to be scraped all around with a blunt piece of sheet metal and then all remaining particles of paste washed off by a forceful stream of water. The washing all around is necessary in order to completely remove any possible trace of paste, that may have remained after the scraping, or which could not be

reached by the scraper. It is quite obvious that the pasting-machine workers cannot lay off the pasted sheets that pass through the machine so even and uniform that the pile would look like a trimmed ream. Now and then a few sheets will overlap a fraction of an inch, and it is here where the hose must be applied with full force to remove all possibility of having two pasted sheets "stick" together.

After removing the pasted stock from the hydraulic press it should be brought to the lofts and hung without delay. There should be sufficient drying facilities in order not to force the process of drying. Lofts should be equipped with modern patent hangers, made of iron. They are preferable to the old-fashioned wooden clasps which cause a great deal of broke because of their cutting into the sheets at both holding corners.

Whenever possible pasted sheets should be hung single, as they will dry far better than those that are hung double or threefold. Furthermore, to hang the sheets single will eliminate the subsequent work of stripping, that is, separating them from each other, since, obviously, sheets will occasionally paste together after having been subjected to the pressure of the iron clasp for many hours.

The process of drying must be slow. Thirty-six hours or approximately that much time, will be needed for a singly hung sheet to dry without steam heat. On warm and dry summer days the process of drying will, of course, be very much quicker. The process of drying depends to a great extent upon the humidity in the air, and the opening or closing of the windows must be regulated accordingly to obtain the best results.

When using steam heat the heat should be admitted gradually. A too intensive and sudden heat will invariably curl the sheet, at least around the edges and thus prolong the period of seasoning and even cause wrinkles during the plating.

After the sheets are removed from the lofts they should be separated; if hung double, looked over very carefully and sorted for seconds. Then they should undergo a seasoning of two or three days before finishing. During the process of seasoning piles are to be weighed down by heavy wooden platforms, which are to be a few inches larger than the paper. Strong straps with buckles tied around the seasoning piles and gradually tightened, help greatly in obtaining an entirely flat sheet.

Machine dried papers require, as a rule, less time and are easier to handle, since they consist of different raw materials and are softer on account of slack sizing. A moderately sized papeterie paper will always take the paste more readily than a hard sized, loft dried sheet.

Whenever possible machine dried papers should be pasted in rolls on roll pasting machines, as this method is very much cheaper because of the higher production attainable and the lower percentage of broke during the process of pasting.

Roll Pasting

The machine itself must be equipped with a sufficient number of driers to insure gradual drying of the pasted stock. Insufficient driers will cause wrinkles and ripples, the sheets will curl and even burst along the edges, as the intensive heat and attendant rapid process of drying does not allow the paper sufficient time to thoroughly absorb the paste. The heat will simply evaporate the water in the paste and thus render the latter ineffective.

The roll pasting machine must have sufficient stands (bearings), to permit pasting of as much as five ply, although most papeterie papers, etc., are pasted two and three ply in the weight of twenty-eight to thirty-two pounds folio.

Papers for the roll pasting machine are, of course, always machine dried or dried over some modern drying apparatus that has come into use during the past few years to replace loft drying. Therefore, while those obstacles adherent to loft dried papers are not here encountered, several factors ought to be taken into consideration in order to produce a good sheet at maximum production.

First of all, in making the paper on the machine, special care must be taken to avoid thin edges. Paper with thin edges has the tendency to curl, even if pasted in the utmost careful manner and no seasoning or subsequent process of finishing will remedy that condition.

Rolls of thirty or thirty-two inches diameter are the maximum for the roll pasting machines. To make them larger renders their handling slow and unnecessarily difficult, even if the pasting machine is provided with a chain-fall or automatic "loading" device. Breaks in the rolls have to be properly spliced. A good method of splicing a break is to use heavy gummed tape of at least three inches width across the roll with four or five supporting strips at right angles. If breaks are not spliced the pasting machine tender will have endless troubles, his output will diminish and his broke increase correspondingly with the number of breaks.

Rolls have to be wound hard and even and in such a way that the felt side will be the outside of the pasted sheet. It is also advisable to mark the rolls with the position made on the paper machine, that is, front, center and back. Cores must extend throughout the width of the roll and never be larger than the paper. Iron cores or strawboard cores of three inches diameter are always very appropriate. I had many cases where customers sent paper to be pasted with any kind of cores from one inch to six inches in diameter and sometimes exceeding the width of the paper by many inches.

Now and then rolls without cores, just wound on the shaft, were delivered and added greatly to my

troubles. It required a large assortment of shafts and collars to put those manifold selections of cores onto the machine and paste the paper. Ultimately a standard core of three inches diameter was adopted and our customers by-the-by delivered their papers to conform to our specifications.

The paper should be sufficiently wide to leave enough for trimming—one-half to three-quarters of an inch—and properly marked, whether they are to be used for tops or centers. Rolls with slight defects in the color of the paper (if not too pronounced), specks or other marks can be used very well for centers.

Employees should be instructed to handle all rolls with the utmost care in order to avoid damaged ends. Only too often rolls are dropped carelessly from elevators or trucks and the ends bruised; thus frequently many pounds of paper have to be cut off the roll and thrown into the broke box.

The speed of the roll pasting machine is to be adjusted to the thickness, grade and drying quality of the paper. A slack sized, machine dried paper will readily absorb the paste and permit a greater speed than a hard sized paper. Too great a speed will leave the paper with a "rippled" surface and curled. It is bad policy to have the quality suffer for the sake of a slightly higher production; it does not pay and never will.

Roll pasted papers are to be sorted at the machine, that is, the person attending to the automatic cutter has to throw out all seconds. To prevent finger marks employees on the roll pasting as well as sheet pasting machines should be provided with strong, white cotton gloves.

A large percentage of broke can be avoided, if the fact that the paper is for subsequent pasting is taken into consideration at its manufacture. A little attention paid to the factors pointed out in the preceding lines will not only render the process of pasting very much easier, but also increase the output and lower the cost to a minimum.

To the persons superficially acquainted with the work the procedure of pasting may seem ridiculously easy; the man doing it thinks very different. He knows what endless troubles a curly sheet or sheet sized so hard that the paste cannot penetrate its surface, or rolls that are soft and with many unspliced breaks, will cause him.

Mills with their own pasting plant are in a far better position than a job pasting plant, which has, in many cases, to accept and try to paste the paper as forwarded by the customer. A short experience with a pasting machine will teach a mill how to manufacture papers best fitted for pasting. Job pasting plants can not do very much in that respect if their customer cannot be persuaded to conform to some of the pasters' rules. To refuse to paste the paper means the loss of a customer, to paste it and return it with 50% broke will bring the very same undesirable result. Hence, all pasters are either baldheaded, having pulled out their hair in despair or it turned gray prematurely.

Paste

The opinions as to the most suitable grade of starch for pasting purpose differ widely. Some firms put on the market a starch made purposely for the use as paste and good results have been attained with those products. It is evident, that only the very best grades should be selected and the paste itself prepared with the greatest possible care. I have boiled paste from ten to twenty minutes, according to the grade of paper I intended to use it for. If I had a very hard sheet I boiled the starch the maximum time, while I found ten minutes boiling for a slack sized, machine-dried paper entirely sufficient. Tanks for the preparation of starch ought to be large enough to allow preparing of the supply for a whole day. The paste troughs in the machines must be kept well filled up with paste and the latter in a good running condition, and above all, free from lumps and small particles.

If machines do not run twenty-four hours a day and some paste is left in the vat on the following morning, the hard surface may be skimmed off, some cold water poured in, steam injected and the paste will be ready for reuse.

Wage System

On the sheet pasting machines, where one girl feeds the sheets in and two girls lay them off, the introduction of piece rates is advisable. In our plant, for instance, I introduced piece work rates on hand of records covering a period of one year. In addition I made a thorough time study for several weeks and thus evolved true rates that were fair to the employee and enabled the girls to earn from thirty to forty per cent more than their former daily wages. The output increased, of course, correspondingly, while the quality did not suffer at all. To the contrary, the girls used more care than ever, as I had established a routing of rigid inspection and any tendency toward careless work to boost the output while the quality of the pasted stock declined was remedied at once.

To establish fair piece work rates required concentrated attention, as, logically, several rates had to be introduced in accordance with the various grades, sized and weights we pasted.

The roll pasting machine tender received a bonus on all tonnage he made above the established maximum quantities. His helper also received a bonus on the very same basis.

Those piece rates and bonuses were not discontinued or readjusted, as soon as the employees began to earn good money. By keeping them up and increasing them whenever other wage earners received an increase in their wages (a frequent occurrence in these days of "industrial readjustment") we had loyal

employees who took real interest and pride in their work.

The Working Force

The number of employees should be kept down to a minimum. A roll pasting machine requires a tender and one helper. The helper will assist the tender in putting the rolls into the machine, attend to the cutter box and remove the pasted stock. The machine tender will prepare the starch, get the rolls ready for the machine and, of course, supervise the process of pasting. It is essential to have spare sets of shafts so that the required rolls may be prepared for the machine during the run of one set. To have a new set prepared and ready for the machine will eliminate all waste of time in loading and increase production.

In some mills where conditions are peculiar the size of the roll pasting machine and the grade of paper pasted thereon may require three persons for the operation of the machine. In that case a girl should be hired to tend the cutter box so that the helper can devote his time to other heavier work.

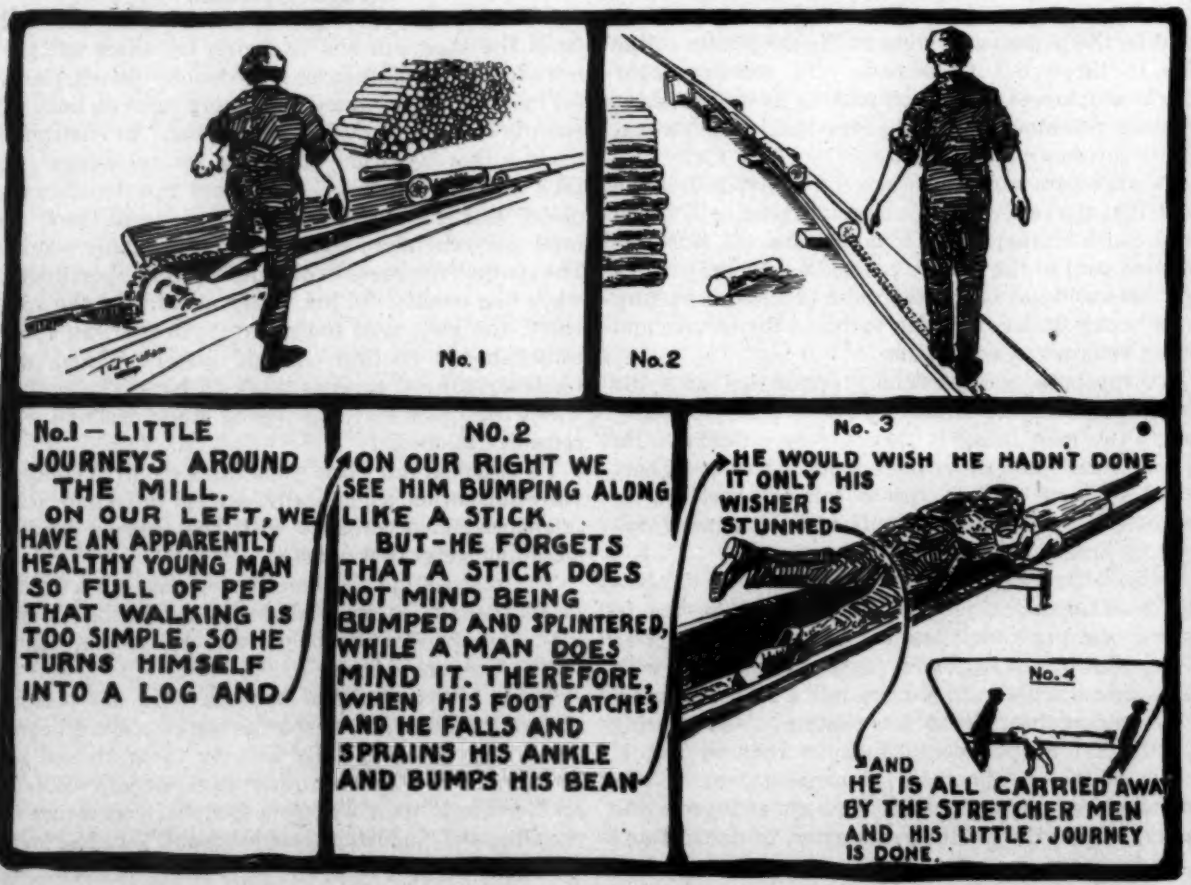
On the sheet pasting machines one girl is to feed the sheets into the machine, while two girls lay off the pasted stock.

Tables for the pasted, wet sheets should be level with the wet end of the pasting machine and adjustable in order to facilitate the work.

Besides those girls one man is needed to make paste and put the paper into the hydraulic presses, supply the girls with paper and do other work. One girl is needed to hang and take off the paper and one to reverse the single sheets and separate and sort the stock taken from the loft. If conditions allow one girl and one man may be able to do the work.

With the increased use of pasted papers for greeting cards and cards of all other description, paper for lithographic purposes, photomounts and so on, the process of pasting should receive greater attention from the manufacturer who makes those papers, but sends them out for pasting. Whenever possible the paper manufacturer should build or buy a pasting machine for his own plant. All excessive handling, cartage, etc., will be eliminated and consequently the cost of the product lowered. Above all he will learn to know thoroughly how to manufacture his papers in order to obtain the best possible results in the subsequent process of pasting.

There are many other conditions to be considered in roll or sheet pasting, pertaining to mills, their products and pasting machines. Only practical experience and actual work will enable the operator to overcome all obstacles and attain satisfactory results. Cicero, the Roman orator said, "Empta dolore docet experientia," which means in plain English, "Experience bought with pain teaches."


No. 1
No. 2
No.1 — LITTLE JOURNEYS AROUND THE MILL.
ON OUR LEFT, WE HAVE AN APPARENTLY HEALTHY YOUNG MAN SO FULL OF PEP THAT WALKING IS TOO SIMPLE, SO HE TURNS HIMSELF INTO A LOG AND
NO. 2
ON OUR RIGHT WE SEE HIM BUMPING ALONG LIKE A STICK.
BUT-HE FORGETS THAT A STICK DOES NOT MIND BEING BUMPED AND SPLINTERED, WHILE A MAN DOES MIND IT. THEREFORE, WHEN HIS FOOT CATCHES AND HE FALLS AND SPRAINS HIS ANKLE AND BUMPS HIS BEAN
No. 3
HE WOULD WISH HE HADN'T DONE IT ONLY HIS WISHER IS STUNNED
No. 4
AND HE IS ALL CARRIED AWAY BY THE STRETCHER MEN AND HIS LITTLE JOURNEY IS DONE.

Paper Making Tests with Bamboo

By VIDAL and ARIBERT

Professors at the French School of Paper Making, Grenoble

Translated from the official report of the Congrès de la Production Coloniale, Marseille, 1922, pages 109 to 116, by A. Papineau-Couture.

FOR a long time bamboo has been extensively used for making paper in Annam as well as in China. The native methods of treatment give colored papers, more or less brownish, which are strong, flexible, light, agreeable to the touch, in a word, of very good quality. European processes give papers which are not so strong but which are whiter, have a good appearance and are specially suitable for fine writing and printing papers.

Bamboo is very abundant in Asia and in Africa, and the number of different species is very large, over 50 being known in Indo-China alone. For paper making the species having hollow stems of fairly large diameter, and long internodes, are the only ones used. The Europeans call them "female bamboos" and the natives "Nuà." The male bamboos, which are thicker walled and have numerous well-developed nodes, are hard and very difficult to pulp. Small species are not advantageous for paper making.

The three species which are chiefly used at the Viétri mill (Indo-China) are:

1. **Nuà-dai**, a very large species which is thick-walled; it is expensive because it is highly prized for building purposes;

2. **Nuà-bay**, a medium-sized, hollow bamboo, which is by far the most commonly used in paper making. It is sold in bundles of seven, whence its name ("bay" means 7 in the Annamite tongue);

3. **Nuà-tep**, a small slender species, which is only about 2 centimeters in diameter. It is inferior to the preceding species, and also cheaper.

Auguste Chevalier, who is continuing the very fine botanical work of Camus on Indo-Chinese bambuseae, is of the opinion that these different species of Nuà belong to the **Bambusa** and **Dendrocalamus** genuses; but it has been impossible to identify them with certainty. The impossibility of identifying the species unfortunately prevents a comparison with the five species from India and Burmah which have been studied by English authors, namely, **Bambusa arundinacea, B. polymorpha, B. Tulda, Cephalostachyum pergracile,** and **Melocanna bambusoides.** These various species, which differ in height, diameter, hardness, etc., should not all be treated in the same manner: whereas some require but 10 per cent of caustic soda, others require 20 and even 25 per cent; some are easy, others hard to bleach; and so on with other properties.

The diversity of the species, which generally occur mixed together in the same stand, accounts for part of the difficulty encountered in the treatment of bamboo. Differences in age are another cause of trouble. For paper making bamboo should be cut young, preferably about two years old according to English authors, and certainly not older than three years. If it is allowed to become older, it becomes lignified, hard, and colored, rendering the crushing more difficult, requiring more drastic cooking conditions, and giving a pulp which is not so well bleached; in a word, the whole treatment is longer and more expensive without any compensation as the finished product is by no means of better quality.

In Tonquin, along the Red and Claire Rivers, the bamboos are cut by the natives in mixed stands, and they take them of all ages, and even have a tendency to take the older ones as they are longer. Under these circumstances the raw material is essentially variable in composition and properties, and the paper maker must therefore use a drastic treatment to reduce the hardest portions, and the remainder, which does not require to be treated so severely, suffers in consequence. As Mr. A. Janvier, technical director of the Papeteries de l'Indo-Chine, has very judiciously remarked, "The enormous differences existing between various species, and even in the same species according to the age, plainly show the great importance of treating together: (1) only the same species, or species which require the same treatment; (2) stems which are all of the same age."

We do not propose to describe the treatment of bamboo as it is carried out in Tonquin, India, and the British possessions; if the reader wishes he can consult the works of Routledge, Sindall, Raitt and Pearson which are given in the bibliography at the end of this article. Our purpose in undertaking the tests which we shall describe was to ascertain if the well-known soda process can easily give a suitable pulp when the material is subjected to a thorough mechanical treatment before cooking. The improvements in the manufacture of crushers of late years and the development of hydraulic power lend added interest to this aspect of the problem.

Formerly, the bamboo was cut obliquely into lengths of 2 to 3 centimeters (Milne, Cuvier, Niethammer, etc., cutters), and the nodes were removed. Owing to the very considerable wear of the saws, which was inevitable with such a hard material, to the high loss caused by the removal of the nodes, especially in species where they are close together, and to the fact that pieces 2 to 3 centimeters long were still difficult of penetration by the

liquor, a more efficient method of subdivision was sought out. It is especially to W. Raitt that the crushing methods now in favor are due. They consist in crushing the stems completely without bothering about the nodes. This is done by powerful machines very similar to rolling mills. The bamboo stems are sent in as they come to the mills, and they come out completely disintegrated, as a bundle of threads which have been likened to esparto. This crushing action depends on the lack of longitudinal resistance of the bamboo, which is as easy to split as it is hard to cut transversely. The machine, therefore, does not require any extraordinary amount of power; it has no saws nor knives, and does not require much up-keep. The yield is higher, for the nodes are not removed and the whole stem is utilized. Finally, the crushed material is much more easily penetrated by the liquor; crushed bamboo instead of floating almost immediately sinks to the bottom.

However, crushed bamboo has one drawback: it is very bulky and requires about twice as much room in the digester as cut bamboo. But the advantages are such that the manufacturers are unanimous in declaring that the number of digesters should be increased. One cubic meter of digester space holds about 128 kilos of crushed bamboo.

The chemical treatment of bamboo is in all points similar to that of esparto and straws. Alkaline processes (soda and sulphate) are the only ones that are suitable for this material, which Cross and Bevan picturesquely describe as a "gigantic straw." For it is a gross mistake to class bamboo as a wood, as it has neither the structure nor the chemical composition of wood. It is therefore quite natural that the sulphite process should be unsuitable and should yield an altogether unbleachable pulp. All attempts along this line have failed, as was to be expected.

Pulping Tests

Our experiments were caried out with 80 kilos of large hollow bamboos, improperly called "female bamboos" or "Nuà-bay," which is the most widely used and best suited variety. They were of good quality and on the average had a mean diameter of 5 to 6 centimeters. Their color was light brown. The nodes were spaced about 50 centimeters apart.

We first removed the nodes by sawing them, which gave a loss of 11 per cent. This, however, need not be a loss if the material thus removed is treated separately, as is sometimes done.

The internodes were split, and the pieces about 50 centimeters long were repeatedly passed through a crusher having corrugated rolls. Using a laboratory crusher, we experienced no difficulty in reducing the material to about the size of esparto grass. The material was put through a straw-cutter, which cut it into lengths of 5 to 6 centimeters. After air-drying the material thus prepared, it contained 12 per cent of moisture.

The material was charged into a rotary digester where it was steamed for 2 hours at a pressure of 1 to 2 kilos. After removing the condensed water, which was very dark in color and contained a considerable amount of dissolved material, the alkaline liquor was introduced into the digester. Cooking was carried out under the following conditions:

Caustic soda	15 per cent
Concentration	6° Baumé
Pressure	4 to 4.5 kilos
Time of cooking	7.5 hours

This treatment was based on the process used in Scotland during the war, where bamboo pulp was manufactured by a low pressure process, using the equipment that was lying idle owing to a practically complete stop in the esparto industry.

The results were considered satisfactory. Apart from a small amount of uncooked material, for which we could find no satisfactory explanation, the material was sufficiently softened to allow of its being defibered. This was carried out in a defibering and washing engine, the cylinder being let down right from the start; the pulp breaks up easily and loses the slightly lumpy appearance which it has when it comes out of the digester. It is of a rather light brown color.

The pulp was bleached cold, in a bleaching beater, with 16 per cent of bleaching powder and 0.3 per cent of sulphuric acid. The operation proceeded normally, but there was a certain amount of lumps formed. The bleached pulp was washed for a long time with large quantities of water.

The yield of bleached pulp was 40 per cent, which is equal to what is generally obtained in practice.

Paper Making Tests

The pulp obtained in the manner described above is sufficiently strong to stand beating. It must, however, be carried out carefully, the cylinder being kept down. It removed all the lumps formed during bleaching. The stock was engine sized and slightly loaded with starch. Starting up and running on the machine offered no difficulties.

The paper was 0.10 millimeter thick and weighed 56 grams per square meter. It was of a slightly creamy white, and the formation was slightly wild. It was flexible, and strong, and would be quite suitable for printing. The strength tests gave the following results:

Breaking length—machine direction	3,357 meters
cross direction	1,955 meters
average	2,656 meters
Bursting strength	1.06 kilos

Micrography

Bamboo pulp is remarkable for its essentially fibrous structure. The fibers are similar in shape to those of rye straw, but are appreciably larger and stronger. The length varies from 1 to 4 millimeters, averaging about 2 millimeters, and the average diameter is 0.015 millimeter.

The fiber is regular, cylindrical, with small nodes and gradually tapering ends. The lumen is usually small, so that the walls of the fiber are quite thick, which accounts for its strength. The number of breaks in the fibers is by no means excessive. We vainly looked for the transparent sheaths which occasionally surround the fibers in Indian pulps, and which we have frequently observed in the latter. According to Hanausek, this sheath occurs only in **Cephalostachyum pergracile,** which was certainly not the variety which we used in our investigation, and which very likely is not to be found in Tonquin.

One of the peculiarities of bamboo pulp is the presence of a certain number of immature fibers, which are thin-walled, transparent, and flat like a ribbon. They are found especially in pulps prepared from young and tender bamboos, so that their absence, or their fewness, can furnish interesting information.

The ratio of the diameter to the length of the fiber shows a satisfactory felting power:

$$\frac{15}{2{,}000} = \frac{1}{133}$$

The non-fibrous elements are never numerous in bamboo pulp and form an almost negligible proportion of the mass. This is especially true in the case of the pulps which we prepared, which is certainly due to the fact that they were washed very thoroughly.

These elements are just the same as those found in ordinary straw: parenchymatous and sclerous cells, vessels and tracheas. The parenchymatous cells are barrel-shaped; the sclerous cells are nearly all elongated and rod-shaped; the vessels vary considerably in size, being sometimes much larger than those of straw, they are pitted or striped; the tracheas are fairly large and quite numerous. One of the characteristics of bamboo pulp is the practically total absence of epidermic cells.

All the elements which we have just described are completely isolated and are evenly colored violet blue by Herzberg's reagent. This shows that the material has been completely disincrusted and defibered; in other words, that the treatment is satisfactory.

Conclusion

Our tests have fully borne out the exactness of modern ideas on the efficiency of the preparatory mechanical treatment, and on the manner in which this treatment should be carried out in this case.

We believe that good results should be obtained with Indo-Chinese bamboo by the regular soda process in conjunction with the following steps:

1. Removing the nodes, which may be treated separately so as not to lose them;
2. Dividing the material by a thorough crushing treatment;
3. Steaming before cooking, which gives a very light colored unbleached pulp;
4. Cooking at a low or medium pressure.

By this process only a mild cooking is required, which consumes relatively small quantities of caustic soda and which is consequently economical. If it is combined with a judicious choice of raw material, which will be possible by a suitable selection and proper cutting methods in the stands, such a process should yield a product which is at the same time easy bleaching and hard and strong.

In a word, bamboo papers manufactured by modern processes should have the greater whiteness demanded by European taste and requirements, and at the same time should retain the exceptional strength and softness for which the native-made papers are famed.

One of Henry Ford's Four Production Principles

(1) No Process, no method, is ever considered as having been perfected. It is considered as in use only until a better method is devised. Therefore the attention of everyone is fixed upon doing the thing better, and hence there is never an opposition to change.

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The Fourdrinier Machine

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This is the final instalment of the article on the Fourdrinier machine.

The Harland System

As in the two previously mentioned systems each section of the paper machine has a direct current motor of suitable capacity coupled to it. This capacity is dependent upon the size and speed of the paper machine and from present installations may vary from 10 H. P. to 160 H. P. per section.

The motors may be coupled to their respective paper machine sections either directly or through some form of speed reduction gearing. It is probably best because of space considerations to direct-couple on high speed machines and to use some form of gear box, either of the worm or herringbone type, on slow speed machines.

In some installations the motors may be placed alongside the paper machine. These motors are of the totally enclosed forced ventilated type and are capable of withstanding the severe operating conditions at the wet end of the machine. A nice arrangement in the case of a new mill is to build an annex for all the electrical equipment and to pass the driving shafts through one of the walls to each of the various sections.

It is also necessary as in the Westinghouse and General Electric systems to control the speed of each individual motor in its proper relation to every other motor in the drive. This is accomplished by means of an extremely sensitive governor in the form of the Harland Interlock Control.

The arrangement of the Interlock is shown in the accompanying drawing.

A light master shaft, located in any convenient place, extends the full length of the variable speed end of the paper machine. The shaft is approximately two inches in diameter. A differential gear box is inserted along this shaft at the side of each section. The differential gear box (A) consists of a bevel wheel (P) free to revolve on the cone pulley shaft (S) and a bevel pinion (Q) mounted on the master shaft (R). Three planetary pinions (L), attached to the bevel wheel (P) mesh with the sun wheel (K) and with the internal teeth of the annular ring (N). The sun wheel (K) is keyed to the cone pulley shaft (S). Outside the annular ring (N) are a number of teeth engaging with another spur wheel (O) which is mounted on shaft (T). This shaft is connected by means of a coupling to a shaft carrying the brush arm (D) in the automatic differential regulator (C). There will be no resultant motion on the annular ring (N), if the shaft (H) carrying the cone pulley (I) which is driven by the section motor is run at the same speed as the bevel pinion (Q) located on the master shaft. However, if there is any variation in speed, an instantaneous response is given on the annular ring (N) and therefore on wheel (O) which is driven by the annular ring. In each case the bevel pinion (Q) is driven from the cone pulley from the motor which has to be controlled. Therefore any tendency to difference in speed between the master shaft and the motor to be controlled is immediately reflected on the annular ring.

The automatic differential regulator (C) contains a number of resistance units (B). These units can be cut in or out of circuit in series with the field of the motor to be controlled. The circuit passing through the brushes (X) and (Y) which travel over a number of contacts (F), is completed through the brass ring contact (E). In practice the brush arm (D) quietly oscillates between two neighboring contacts of the forty contacts on the regulator.

If the machine operator desires to change the draw between sections, he has only to move the belt on the cone pulley.

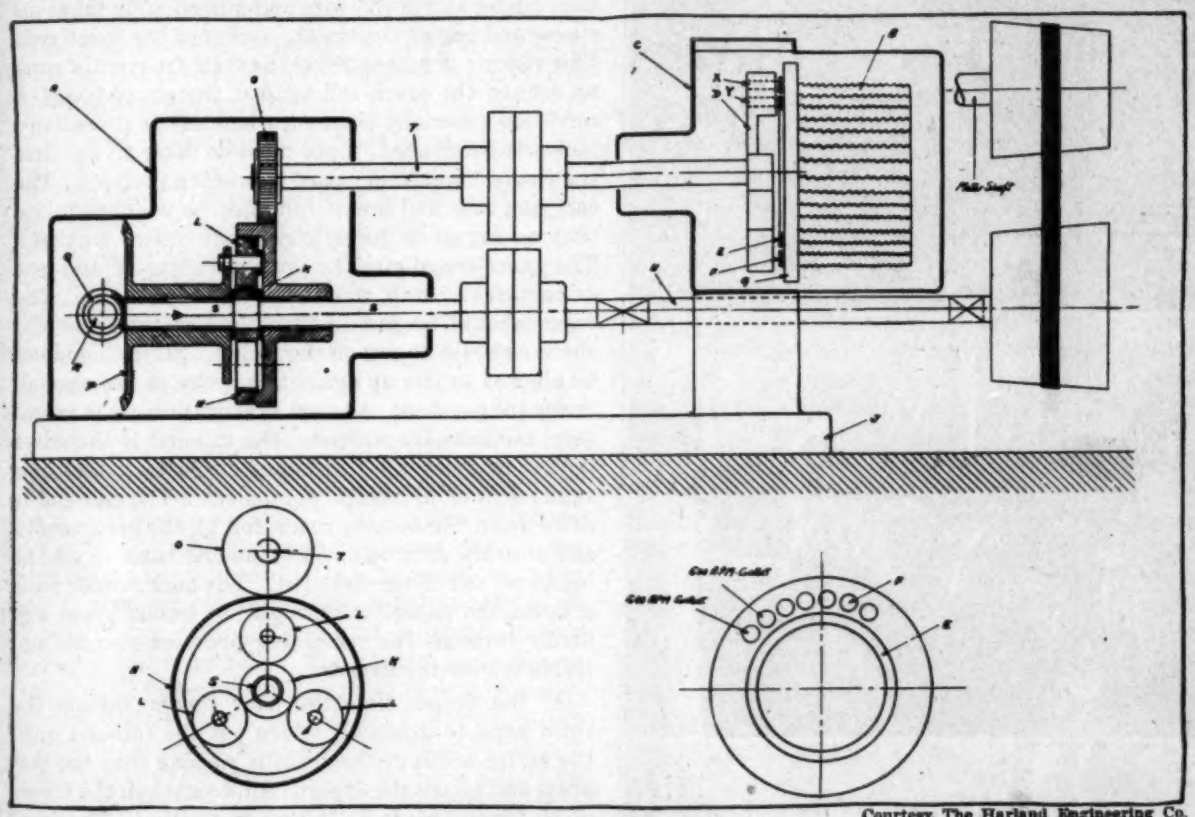
The master shaft (R) may be driven by a master motor or it may be driven by one of the section motors. In the latter case the section motor would act as the master and would not of itself be controlled.

In case of a small machine the starting arrangement of the motors may be of the hand operated type, whereas an automatic starter with push buttons on the front side of the machine is used to give "start," "inch," "stop," and "reverse" speeds on a large machine. A further button may be added to shift the belts on the cone pulleys by means of a motor operated belt shifting device on the cone pulleys.

Other systems of electric drive are also in use and are giving good service.

The outstanding advantages claimed for sectional electric drive are:

1. Each section is an entirely separate unit. This feature permits practically an immediate detection of trouble, and the meters give immediate indication of the character of the trouble.



Courtesy The Harland Engineering Co.

Arrangement of the Harland interlock control

2. The alignment of drive is practically perfect.

3. The power consumption is less than 2/3 the power consumption of a mechanical drive even on slow speed machine.

4. A material saving in floor space is effected.

5. The personal hazard of machine tenders is reduced.

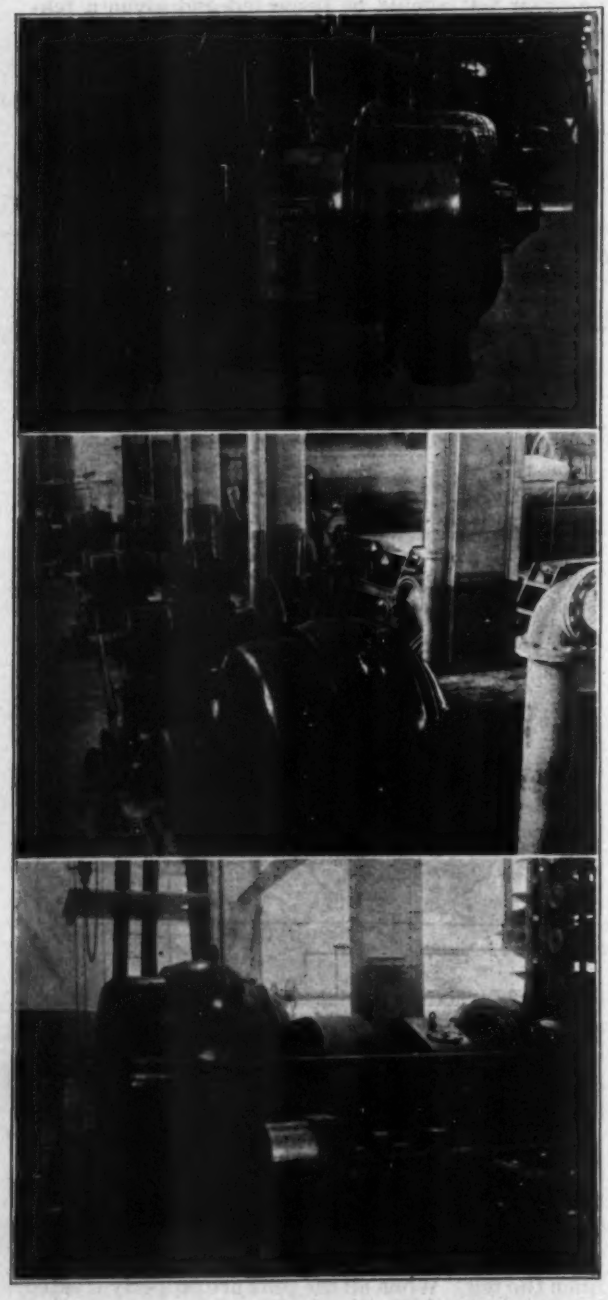
Operation

The dryers should be started in advance of the other parts of the machine. Steam should be admitted to them so that they will be at the right temperature when the paper is put over. However, steam must not be admitted to the dryers before they are started, since the water which would probably be lying in the bottom of the cylinders would cause an uneven heating and the dryers would be strained due to unequal expansion. It is best to admit the steam in such a way that the excess water will be quickly removed. The drip line valve is opened to do this, after which it is closed to a point where the water will be extracted without wasting steam. The inlet valve should be set at a point adapted to the sheet of paper to be made. As soon as the dryers have been started and the water has been exhausted from them, the dryer felt should be inspected and given a tension so as to run steady and safely.

The woolen felts on the presses should then be put in proper condition. Care should be taken that tools, lumps of foreign material, etc., are not lying around the presses, especially if the presses have been left up prior to starting. The presses should first be let down and then the felts started. The felts should be sprinkled with water from the shower pipes until they are completely saturated. The water should then be shut off and the presses run until all the surplus water is squeezed out and the felts run smoothly. The save-all pans under each set of presses should have a clear outlet so that water will not run down upon the felt. When all the felts are properly treated, they should be shut down, until ready for operation. Such work as has been given is usually allocated to the back tender, third hand and fourth hand.

The machine tender is at the same time getting the Fourdrinier part in readiness for the start. The wire must be given a thorough inspection. No tools or foreign material should be laying around to injure it. Then the wire, deckle straps, couch roll, apron, etc., are washed with a hose. All showers should be opened

wide. All levers and weights on the couch rolls should be in their proper place. The Fourdrinier part is started and run for a few minutes to see that everything is in condition. If everything is found to be



Courtesy The Harland Engineering Co.

A—Typical sectional drive unit
B—A typical Harland sectional electric drive
C—Calender motor, showing Harland automatic regulator and differential gear controlling calender stack

ready for operation, it is stopped, and the vats, screens, pump box and head box are "furnished up."

All hands stand by while the fresh water supply is opened and watch for anything that might need attention. When the clear water furnish is at the sufficient height the stuff tap in the stuff box is opened by the machine tender. The stuff mixes with the return water going thru the pump and into the screens, head box, and onto the apron. As soon as the water contains sufficient fibers for furnishing a sheet of paper, the machine tender signals the back tender who is stationed at the starting lever to start the wire. The back tender starts the wire and immediately takes up a hose and begins rinsing the jacket of the couch roll. This rinsing is necessary as the stuff frequently runs up around the couch roll against the guard-board, a condition especially common when an old threadbare jacket is being used. Care must be taken to see that the entire Foundrinier part is running properly. The carrying rolls and breast roll must be watched to see that no lumps or foreign material collect on them. The guard-board must be properly adjusted and grit or particles of stuff should not be under the lip. The wiper should be put in place and water from the shower should be run on the jacket. Stuff should not be allowed to pile up against the wire in the save-all under the couches. As soon as everything is in readiness, the felts are started. The tail-end of the sheet is then made by the third hand either by means of a squirt gun or by special equipment. The tail-end is lifted from the bottom couch roll by the back tender and onto the first felt. This tail-end runs up on the top press roll of the first felt. The back tender pulls it down and passes it through the second press and finally through the remaining press or presses and starts it over the dryers.

At the proper time the back tender signals the third hand to gradually widen out the tail-end until the entire width of the sheet is passing thru the last press and across the dryers. All weights on the levers of all presses must be in proper position. The temperature of the dryers must be corrected, and if the machine is equipped with automatic temperature control it should be set at the desired point for drying. The tension or draw of the sheet between the different sections must be correctly adjusted, since the sheet of paper is extremely delicate and will break or be rendered useless by any unnecessary strain between the sections.

If a dandy roll is used, it should be thoroughly cleaned and placed on the wire before the paper has been carried through the presses. Suction must be used to give the sheet proper moisture content as it passes under the dandy. If the sheet is too wet, it is liable to be crushed and crush marks would necessarily be found in the finished paper. If the suction dries the sheet too much, it is apt to lick up the web in places or the weight of the dandy may be insufficient to make any impression in the sheet.

After the paper is dried, it is put through the calenders, and from the calenders to the reels.

The machine tender has during this time remained

at the wet end of the machine where he can make adjustments which will insure the safe running of the paper.

A machine is a right hand machine if the drive is on the right hand side of one standing at the winder and facing the screen. The drive is left hand if it is on the person's left, facing the same direction.

Output

There are a number of factors involved in the calculation of the production of a paper machine. The following data are required:

1. Speed of machine in feet per minute.
2. Width of sheet of paper in inches.
3. Width of trimmed sheet in inches.
4. Length of sheet of paper in inches.
5. Number of sheets in ream.
6. Weight of paper per ream.

The general formula for the output of paper per hour is:

$$\text{Output in pounds per hour} = \frac{\text{Speed of machine in inches per hr.} \times \text{Deckle Width} \times \text{Weight}}{\text{Size of sheet of paper in inches (length} \times \text{width)} \times \text{sheets per ream}}$$

A machine operates at 300 feet per minute and makes a deckle width sheet of 90″ with a 50 pound base weight—i.e., 500 sheets 24 inches x 36 inches weigh 50 pounds. In calculating the weight of paper made it necessary to know the number of reams and the weight per ream. The size of the paper in this particular case is 24″x36″. The number of sheets per ream is 500. Therefore, the number of square inches per ream equals 24″ × 36″ × 500. The speed of the machine in feet per minute must be reduced to inches per minute and is therefore equal to 300 × 12. This figure, multiplied by the width of the sheet or 90″, would equal the number of square inches made per minute. One hour's production in square inches is therefore equal to 300 × 12 × 90 × 60. This total area divided by the number of square inches in a ream equals the number of reams. The number of reams multiplied by the weight of one ream (50 pounds) gives the weight of paper produced.

The general formula now becomes:

$$\text{Output in pounds per hour} = \frac{300 \times 12 \times 90 \times 60 \times 50}{24 \times 36 \times 500} = 2{,}250 \text{ pounds per hour}$$

There are a number of other methods that have been used for ascertaining the production of a paper machine, but all of them have been derived from the general formula. A few examples of some of the formulas might be of interest.

$$\text{Output in pounds per hour} = \frac{720 \times \text{speed of machine in feet per minute} \times \text{deckle width} \times \text{weight of paper pounds per ream}}{\text{Number of sheets in ream} \times \text{length of sheet in inches} \times \text{width of sheet in inches}}$$

The 720 is a constant obtained by multiplying the number of minutes per hour by the number of inches per foot.

In case the number of sheets in a ream equals 480, the formula is again simplified:

$$\text{Output in pounds per hour} = \frac{1\frac{1}{2} \times \text{speed of machine in feet per minute} \times \text{deckle width in inches} \times \text{weight of paper in lbs. per ream}}{\text{Length of sheet in inches} \times \text{width of sheet in inches}}$$

The 1½ is obtained by dividing 720 by 480.

The width of the trimmed sheet applies to the width of the trimmed finished paper at the end of the machine. The general formula does not take into account the allowance necessary in trimming edges. In most cases the deckle width is so arranged that the paper is cut into strips of equal widths when leaving the calenders.

The general formula might also be used in calculating the speed at which the machine must be driven. Let X equal the speed of the machine in feet per minute:

$$2{,}250 \text{ lbs.} = \frac{X \times 12 \times 90 \times 60 \times 50}{24 \times 36 \times 500} = 7.5\,X = 2{,}250$$

$X = 300$ feet per min.

A handy formula for determining the output of a machine might also be given as it is very easily used:

$$P = \frac{S \times N \times W}{L \times R}$$

P = Production in pounds per hour.
S = Speed of machine in feet per hour.
N = Number of sheets in trim.
W = Weight per ream.
L = Length of ream sheet in feet.
R = Number of sheets in the ream.

$$P = \frac{18{,}000 \times 3\frac{3}{4} \times 50}{3 \times 500} = 2{,}250 \text{ pounds}$$

The foregoing article is not the product of the author alone. He has been helped by his colleagues in assembling data and material furnished by a number of manufacturers and engineers, and he takes this opportunity of thanking all of them heartily for their assistance and co-operation.

Rather than mark the men who have been careless the director of safety for the Inland Steel Company gives special attention to the employees who have avoided accidents. Every month, a group picture of the men employed in each department which is able to carry on for that time without a single accident is taken.

Every man in the department is given a copy of the photograph and a personal letter of commendation is attached to the picture. This recognition is especially appreciated by all of those men who win it.

The plan, after several months' trial, is helping wonderfully to maintain plant spirit and to encourage the workmen in their efforts to prevent many careless accidents.—Factory.

Chemistry of Pulps

A Comparison of the Chemical Changes of Jack Pine and Aspen Woods Cooked by the Soda Process[1]

By M. W. BRAY[2] and T. M. ANDREWS[3]

THE chemical changes which take place in jack pine and aspen woods during the decomposition to pulp with caustic soda solution under one set of conditions, have been studied.

The yield of pulp decreases very rapidly during the initial part of the cook to practically a constant value. During this period of rapid drop in yield, most of the chemical changes take place in the wood and products of the cook. This is shown by the rapid increase in purity of the pulps in cellulose with subsequent loss of lignin.

The rate of decomposition of the cellulose is proportionately more rapid than the rate of decomposition of of lignin to cellulose removal being approximately 1:1. the lignin during the early stages of cooking, the ratio As the cook proceeds the ratio increases to a higher value which is maintained to practically the end of the cook. This indicates that with the present methods of cooking, even under refined methods of control, it will be impossible to obtain the yield of cellulose predicted by chemical analysis of the wood.

The pentosan content of aspen is reduced rapidly during the early stages of the cooking process, to a constant value (7.7 per cent.) This minimum value is reached at the same time that the maximum purity of the pulp is attained. This indicates that pentosans are present in at least two forms, one readily removed from the cellulose nucleus by hydrolysis and the other held in more stable combination with the cellulose.

The alpha-, beta-, and gamma-cellulose was in each case determined in the cellulose. The alpha- and beta-cellulose for both woods decrease only slightly throughout the cook, while gamma-cellulose decreases rapidly to a low constant value early in the process.

This investigation is part of a study of the fundamentals of the chemistry of the alkaline processes.

The object of the work is to show by chemical means some of the changes which take place in wood, such as the relative loss of lignin and cellulose, and the changes in the nature of the cellulose and pulp with duration of the cook.

As it is impossible to obtain representative samples of the pulps during the cooking period, the cooks were blown at definite intervals from the impregnation stage to the finished or well-cooked product. In each of the cooks, as far as possible, all the factors, viz., concentration of the caustic liquor, ratio of caustic to weight of wood, time to reach maximum temperature and pressure and weight of wood were kept constant.[4]

The concentration of the caustic was 96 grams per liter, the ratio of caustic to wood was 20 pounds to 100 pounds, one hour was taken in bringing the cooks to maximum temperature of 170 degrees Centigrade, corresponding to a maximum pressure of 100 pounds per square inch and enough wood to yield 100 pounds oven-dry was used. Since all these cooks followed as nearly as possible the same curve, the data from the separate cooks could be applied to any similar period during a single cook. Two series were made, one on jack pine representative of the fast growing pine woods, and one on aspen representative of the broad-leaf trees.

Experimental Methods

Sampling.—The products of the cooks were thoroughly washed, shredded by passing through a Williams shredder, and a sample taken for analysis. In the case of the woods and partially cooked woods, the samples were ground until the material passed through a sixty and remained on an eighty mesh standard sieve. The fine material which passed through the eighty mesh sieve was discarded.

Methods of Analysis.—Moisture determinations were made by drying at 105 degrees Centrigrade in order that all results could be reported on an oven-dry basis. Solubilities in hot water and one per cent alkali solution were obtained by treatment with these reagents for three and one hours, respectively, at 100 degrees Centrigrade. The solubility in alkali and in water was determined on separate samples. A corrected value for the solubility in alkali was, therefore, obtained by deducting the solubility in water from that in alkali.

Lignin was estimated by a modification of the method of Ost and Wilkening.[5] The cellulose, pentosans and methoxyl contents of the samples were determined by the methods reported by Schorger.[6] The purified cellulose was examined for alpha-, beta-,

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[1]Presented before the Division of Cellulose Chemistry at the 65th Meeting of the American Chemical Society, at New Haven, Conn., April 2-6, 1923.

[2]Chemist in Forest Products, Forest Products Laboratory, Madison, Wisconsin.

[3]Associate Chemist in Forest Products, Forest Products Laboratory, Madison, Wisconsin.

[4]Cooking data and the analysis of the liquors are given in a report by S. D. Wells and others.

[5]Ost and Wilkening, Cross and Bevan's "Researches on Cellulose," III, 39 (1905-10); Chemiker Zeitung, 461 (1910).

[6]A. W. Schorger, J. Ind. & Eng. Chem., 9 (1917), 556.

and gamma-cellulose by the volumetric method of the authors.[7]

With the results of the above enumerated analyses obtained from the different cooks, it is possible to show some of the causes or at least the stages of disintegration or changes that wood undergoes in the alkali cook.

TABLE No. 1—Analytical data on jack pine series
Results calculated on basis of oven-dry wood except last two columns

Pulp sample	Cook number	Time of cooking	Yield	Solubility in hot water	Solubility in 1% alkali corrected	Lignin	Cellulose	Alpha-cellulose	Beta-cellulose	Gamma-cellulose	Cellulose lost—A	Lignin lost—B	Ratio B/A	Cellulose in pulp	Methoxyl in pulp
No.		Hrs.	%	%	%	%	%	%	%	%	%	%	%	%	%
						Old Liquor									
86	0	0	100	4.8	10.7	32.8	59.8	42.6	0.0	14.8	0.0	0.0	0.0	59.8	4.8
81	842	½	80.7	1.6	3.2	25.6	50.4	16.5	22.6	10.8	9.4	7.2	0.8	62.5	4.7
82	840	1	66.5	1.8	1.9	16.7	47.2	0.0	10.9	9.1	12.6	16.1	1.3	70.9	4.0
83	841	1½	58.4	1.0	2.4	14.0	43.0	32.6	2.9	5.4	16.8	18.9	1.1	73.6	3.5
84	844	2	51.6	0.8	1.2	9.0	42.0	35.1	1.1	4.3	17.7	23.8	1.3	81.5	2.7
117	861	2½	45.5	0.3	0.9	5.1	40.8	35.3	0.8	5.5	18.8	27.7	1.5	89.6	0.0
91	848	3	45.9	0.2	0.6	4.5	42.0	36.9	0.4	6.8	17.8	28.3	1.6	91.5	0.0
90	850	4	46.0	0.3	0.5	4.6	42.0	35.7	0.7	4.9	17.7	28.2	1.6	91.5	1.5
88	846	7	45.9	0.2	1.0	3.2	42.2	35.1	1.2	5.1	17.6	29.6	1.7	91.9	1.2
						New Liquor									
84	844	2	51.6	0.8	1.2	9.0	42.0	35.1	1.1	4.3	17.7	23.8	1.3	81.5	2.7
79	838	3	43.8	0.4	0.5	3.2	41.0	28.5	6.3	5.8	18.8	28.6	1.5	93.7	0.0
92	851	3	44.6	0.0	0.5	4.7	41.2	0.0	0.0	0.0	18.6	28.1	1.5	92.3	1.6
78	837	4	39.9	0.2	0.4	2.6	37.8	27.4	5.6	4.9	22.0	30.2	1.4	94.8	0.0
80	836	5	37.0	0.2	0.5	1.0	35.6	29.7	2.5	2.4	24.2	31.8	1.3	96.4	2.0

Discussion of Results

Cellulose and Lignin.—Since time is the only variable in both series the purity of the pulp, as would be expected, will approach a maximum value. This is shown by the increase in the cellulose and decrease in the lignin content of the pulps.

The data given in tables I and II and plotted in the form of curves in figures 1 and 2, show that the greatest chemical change takes place in the wood during the first two hours of cooking at maximum pressure. During this time the pulps rapidly approach a maximum in quality and purity. Coincident with the initial rapid drop in yield from 100 per cent to 46 per cent for jack pine and to 55 per cent for aspen, the cellulose content of these pulps increases from approximately 60 per cent to 92 per cent and to 97 per cent for jack pine and aspen pulp, respectively. Accompanying this change in cellulose, the lignin content decreases to a minimum value. Beyond this point further cooking of either jack pine or aspen has but little effect on the purity of the pulps. The yield in the case of jack pine reaches a constant value after two hours of cooking, whereas that of aspen continues to decrease slowly with further cooking. This further decrease in yield of aspen pulp is due primarily to destruction of the cellulose and not to further purification of the pulps.

TABLE No. 2—Analytical data on aspen series
Results calculated on basis of oven-dry wood except last two columns

Pulp sample	Cook	Time of cook	Yield	Solubility in hot water	Solubility in 1% alkali corrected	Lignin	Cellulose	Alpha-cellulose	Beta-cellulose	Gamma-cellulose	Pentosan	Methyl pentosan	Cellulose lost—A	Lignin lost—B	Ratio B/A	Cellulose in pulp
No.	No.	Hrs.	%	%	%	%	%	%	%	%	%	%	%	%	%	%
854 A & B	0	0	100	3.5	16.9	23.4	62.1	43.2	9.3	9.8	18.7	0.1	0.0	0.0	0.0	62.1
13	813	½	81.5	4.7	2.3	18.9	57.9	37.3	14.3	3.0	13.0	0.0	4.3	4.5	1.0	71.0
12	812	1	65.0	1.0	2.0	10.9	52.6	35.1	15.5	2.0	9.8	0.0	9.5	12.6	1.3	80.9
11	811	1½	60.5	0.4	1.0	4.8	55.0	52.2	5.2	2.4	8.5	0.0	7.1	18.6	2.7	91.0
10	810	2	57.5	0.0	1.7	3.2	53.6	40.8	9.8	2.5	7.4	0.0	8.5	20.2	2.4	93.3
9	809	3	55.0	0.0	1.2	1.4	53.3	41.4	10.0	1.5	7.2	0.0	8.8	22.1	2.5	97.0
8	808	4	52.5	0.0	1.0	0.9	51.0	40.0	9.2	1.5	8.2	0.0	11.1	22.5	2.0	97.1
17	816	4	53.2	0.2	1.4	0.8	51.2	40.8	8.7	2.0	8.5	0.0	11.0	22.6	2.0	95.5
94*	847	4	42.3	0.2	0.4	1.2	41.2	34.3	4.7	0.8	0.0	0.0	20.9	22.2	1.1	97.4
116*	860	4	43.5	0.2	0.4	1.1	42.0	36.4	2.5	3.7	0.0	0.0	20.1	22.3	0.9	96.5
14	814	5	52.0	0.1	1.1	0.8	50.4	37.0	10.9	2.7	8.0	0.0	11.7	22.6	1.9	96.9
36	817	5	52.5	0.3	1.3	1.5	50.0	38.4	8.9	3.2	0.0	0.0	12.1	22.0	1.8	95.3
70*	830	5	50.4	0.6	0.5	0.8	48.3	28.6	16.3	3.1	0.0	0.0	13.9	22.6	1.6	95.7
15	815	7	49.4	0.0	1.1	0.7	48.0	39.7	5.8	1.8	7.3	0.0	14.1	22.7	1.6	97.4

* Not impregnated with liquor previous to cooking.

During the early stages of cooking wood, cellulose as well as lignin are simultaneously decomposed.

[7] M. W. Bray and T. M. Andrews, J. Ind. & Eng. Chem., 15, No. 4 (1923), 377.

This loss of cellulose takes place even before the digester charge has reached maximum temperature and pressure.

The rate of the decomposition of the cellulose is proportionately more rapid than the rate of decomposition of the lignin during the early stages of cooking. Up to one-half hour before maximum pressure has been reached these losses are 9.4 per cent and 7.2 per cent of cellulose and lignin, respectively, for jack pine and 4.3 per cent and 4.5 per cent of cellulose and lignin, respectively, for aspen wood. These data are contrary to the commonly accepted idea, which has been so clearly stated by Surface[8] as follows: "The effect (cooking is first to remove the inter-cellular substances and part of the ligneous matter from the wood, then the cellulose itself begins to be attacked, and finally after the greater part of ligneous matters has been removed the cellulose alone is affected." During the remainder of the cooking period the lignin loss becomes larger than that of cellulose and the above ratio (1:1) is not maintained. The ratio of the lignin loss to the cellulose loss for the pack pine and aspen series, respectively, ranges from 1.3 to 1.7 averaging 1.45 and 1.3 to 2.6 averaging 2.0. These values hold over a range of time in their respective series, viz., from the point where the cooks are brought up to maximum pressure until the end of the cook. It has been observed that practically the same phenomenon takes place when wood is cooked by the acid process.[9]

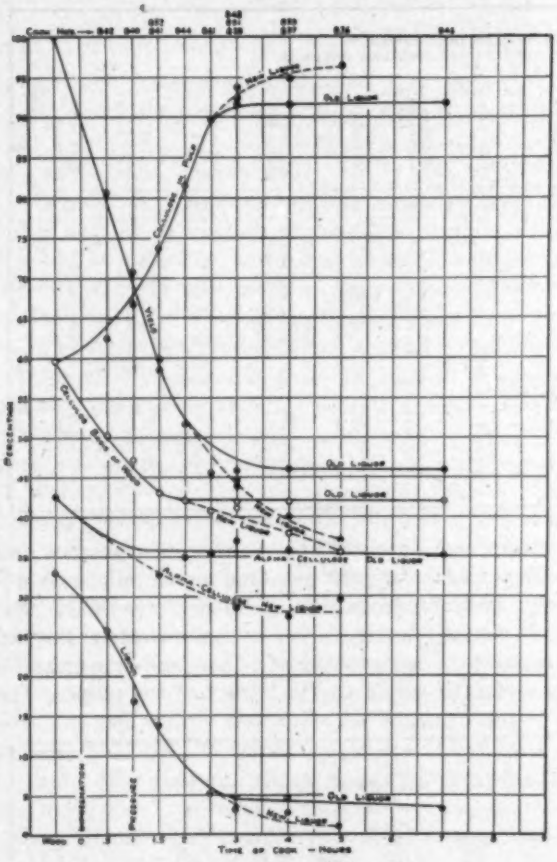


Fig. 1. Jack Pine Soda Pulp

Since cellulose is lost as well as lignin during the early part of both the acid and alkaline cooking processes it may be pointed out that, even under refined methods of control, it will be impossible to obtain the yield of cellulose predicted by chemical analysis of the wood. Possibly by means of a substance which would protect the cellulose from hydrolysis, more nearly theoretical yields of cellulose might be obtained.

Pentosans.—The pentosan content of the aspen wood is rapidly reduced from 18.7 per cent to 7.7 per cent during the first hour of cooking at maximum pressure. Beyond this point the pentosan content remains approximately constant. This minimum value is reached at the time that the maximum purity of the pulp is attained. Although the pulps contain over 97 per cent cellulose they show a content of over 7 per cent pentosans. This indicates that pentosans are present in at least two forms; one readily removed from the cellulose nucleus by hydrolysis, and the other held in more stable combination with the cellulose.

Methoxyl.—The methoxyl content of this series of jack pine pulps was determined by Aiyar.[10] His investigation shows that the reduction in the methoxyl content of the pulps is most rapid during the initial part of the cooking process. It is also shown that there is a very close relation between the lignin and the amount of methoxyl remaining in the pulp, or in other words, the per cent of methoxyl removed is proportional to the per cent of lignin removed. This indicates that the methoxyl content of jack pine is associated with the lignin.

Alpha-, Beta-, and Gamma-Cellulose.—The results of the examination of the cellulose, derived from the pulps of both the jack pine and aspen series, for alpha-cellulose shows a slow rate of decomposition of this substance with duration of the cook.

The beta-cellulose content of the jack pine pulps is considerably lower than that resulting from the aspen series. This may be accounted for in view of the fact that the cellulose from the latter wood contained beta-cellulose, while that from the former did not.

The gamma-cellulose (calculated on the basis of the oven-dry wood) decreases very rapidly in both services to an almost constant quantity during the first hour of cooking at maximum pressure. The

[8] H. E. Surface, U. S. Department of Agriculture Bulletin No. 80, p. 25.

[9] M. W. Bray and T. M. Andrews, Paper Trade Journal, 76, No. 3 (1923), 49.

[10] S. S. Aiyar, "A Study of the Distribution of Methoxyl (of the wood) in the Products of Different Treatment of Wood." Presented before the Division of Cellulose Chemistry at the 65th Meeting of the American Chemical Society, Pittsburgh, Pa., Sept. 4-8, 1922.

data show that the gamma-cellulose is very rapidly attacked in the soda process. The fact that a constant quantity is found in the cellulose after chlorination of the pulps indicates that some gamma-cellulose is formed during the action of 17.5 per cent sodium hydroxide on the cellulose.[11]

Solubility in Water and Alkali.—The initial rapid decrease in the amount of material soluble in hot water shows that the pulps are more easily washed as the cooking proceeds.

The solubility of the products of the cooks in one per cent sodium hydroxide solution (corrected for water solubility) rapidly reaches a minimum value during the early part of the cooking process in both series. This value decreases from 10.7 per cent to 0.5 per cent in the jack pine series and decreases from 16.9 per cent to approximately 1.0 per cent in the aspen pulps. This practically accounts for the rapid decrease in yield of pulp during the first hour of cooking.

Effect of Impregnation.—In all of the cooks so far considered the chips were impregnated with caustic liquor prior to starting the cook. In order to demonstrate the effect of the impregnation process on wood, three cooks were made on aspen under the same conditions as those of the series but without previous impregnation of the chips with liquor. These are numbers 847 and 860, cooked three hours at pressure and 830, cooked four hours at pressure. The results show lower yields of pulp and of cellulose than are obtained by the impregnation process. The ratio of the lignin lost to that of cellulose lost is approximately 1:1 at the third hour of cooking.

Effect of Old and New Liquor.—In the cooks so far considered the impregnation liquor was that which had been used over and over with repeated bringing up to strength by the addition of more caustic soda. Cook number 836 was made by impregnating with new liquor, containing no organic residues from preliminary impregnations. This liquor, each time brought up to volume by the addition of water and refortified with alkali was used for cooks numbers 837, 838, and 844.

The data plotted in Fig. 1 show that new liquor used for impregnation produces a greater chemical change in the pulp than is obtained with old liquor. With new liquor the yield of pulp does not attain a constant value as in the case of cooking jack pine with old liquor. The pulp resulting has a higher purity, the rate of decomposition of cellulose and of lignin is more rapid, and the cellulose obtained therefrom contains less alpha-cellulose than is obtained from the use of old liquor. This would show that with new liquor the pulp increases in purity of cellulose at the expense of yield, as the cook proceeds beyond the point where old liquor ceases to act on the wood. As would be expected the application of fresh white impregnation liquor would have a more drastic solvent action on the wood than would obtain after the impregnation liquor becomes saturated with woody materials, gums, and resins. New liquor

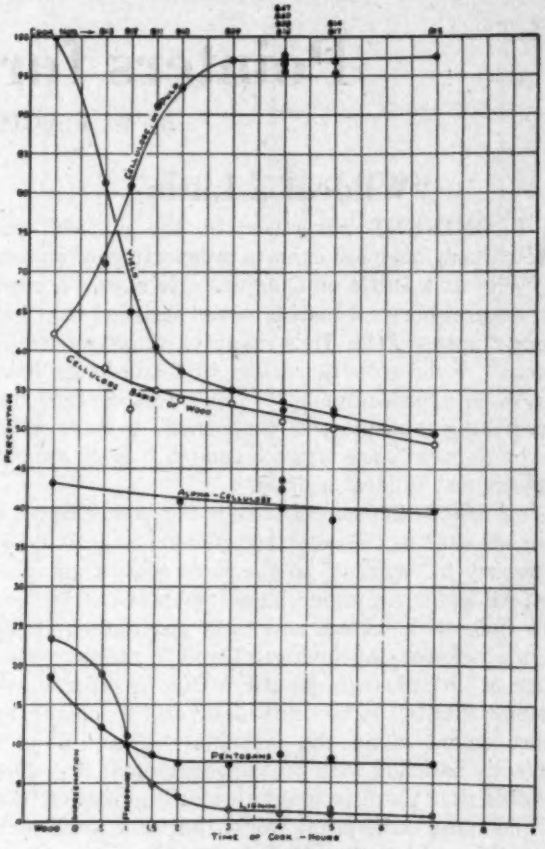


Fig. 2. Aspen Soda Pulp

tends to remove the alkali soluble portion of the wood leaving a smaller amount of actual wood substance to be cooked. This is equivalent to increasing the ratio of caustic to weight of wood. Therefore, if the wood were approximately 10 per cent soluble in the impregnation liquor, instead of cooking with 20 pounds of caustic to 100 pounds of wood, one is actually cooking 90 pounds of wood with 20 pounds of caustic.

Summary

The chemical changes which take place in jack pine and aspen wood have been studied.

Under the conditions of the experiment, the rate of the chemical changes taking place in the woods was greatest during the initial part of the cook. At the second hour of cooking or after one hour at maximum pressure the process is practically complete.

Cellulose begins to decompose very appreciably one-half hour before maximum pressure has been reached at a temperature of 110°C.

During the early stages of cooking, cellulose decomposes at a greater rate than does lignin. Later on in the cook the rate of lignin removal is greater than that of cellulose.

The pentosan content of aspen is reduced rapidly

[11] C. G. Schwalbe and E. Becker; Paper, 27, No. 25 (1921), 21.

during the early stages of the cooking process to a constant value, 7.7 per cent.

The pentosans are present in the wood in at least two forms; one readily removed from the cellulose nucleus by hydrolysis, and the other held in more stable combination with the cellulose.

Pointers for the Engineer

By W. F. SCHAPHORST, M. E.

"Wildcat a Little"

A PROMINENT advertiser in the oil well machinery business exhorts prospective purchasers to "Wildcat a Little on Quality." He says, "A regular, natural-born oil man is never satisfied that he's found the best field. He's ready to admit something better." Ever stop to realize that the same holds true with your equipment? Don't rest content that the drilling machine you "happened" to buy, or the one on the next lease is "good enough." Look around! Investigate! Wildcat a little!

This sounds like good advice to the writer but it so happens that in the selection of machinery it is not necessary to "wildcat" in the same sense that an oil man wildcats. An unpurchased machine can be seen, felt, inspected, tested, and even guaranteed before buying, whereas an undug oil well is usually pretty much of an unknown quantity. One therefore has a better REASON to be continually on the lookout for improvement along the machinery lines. Even if perfectly satisfied with present equipment it is quite possible that there is something on the market that will do more economical work, that will work more efficiently, and make more money for you. If the saving that will be effected is sufficiently great it will pay to scrap present equipment and put in something better—all of which is "modified wildcatting."

Maximum Steam Velocities

WHEN selecting pipe sizes for steam the item of most importance is steam velocities.

Where there is practically no pulsation as when driving steam turbines, a velocity of 15,000 feet per minute is permissible. Eight thousand feet per minute should not be exceeded for reciprocating engines.

For exhaust lines where there is no pulsation 10,000 feet per minute is permissible. Velocities between 20,000 and 25,000 per minute may be used in extremely short pipe lines such as found between condensers and turbines. Where the exhaust line is long and where there are pulsations, do not allow a velocity greater than about a mile a minute.

Fabric Belt Formula

THE rules as ordinarily given for fabric belts made up in plies are something like this: "A 4-ply stitched canvas belt is equivalent to a single leather belt; 8-ply is equivalent to a double leather belt, and so forth." Then after knowing the equivalent we have to hunt up our rules of thumb for leather belts before being able to decide on a width necessary for a given drive.

The writer has hashed over these rules and equivalents and has hit upon a formula that gives a direct answer without mentioning leather at all. The formula applies to most ordinary belts made up in plies such as rubber, stitched canvas, and balata. The formula is:

$$\frac{W\,S}{\frac{2640}{P} + 136} = \text{horse power} = H$$

where W = width of belt in inches;
S = speed of belt in feet per minute;
P = number of plies;
H = horsepower

For example, what horse power may be transmitted by a 10-ply balata belt whose width is 6 inches and whose speed is 4,000 feet per minute? Substituting in the formula we get:

$$\frac{6 \times 4{,}000}{\frac{2640}{10} + 136} = 60 \text{ h. p.}$$

Thrown into other forms for the determination of either W, S, or P we have:

$$W = \frac{H}{S}\left\{\frac{2640}{P} + 136\right\}$$

$$S = \frac{W}{H}\left\{\frac{2640}{P} + 136\right\}$$

$$P = \frac{2640}{\frac{WS}{H} - 136}$$

The Lights Flickered

A NUMBER of years ago the writer had an experience with flickering electric lights that may be of interest to some paper mill engineers who are now having or may have similar trouble in the future.

The engine I was operating was of the flywheel governing type, directly connected to the generator. The electric lights flickered and I was at a loss as to how to remedy the defect. When new, the engine

operated satisfactorily, without causing flicker; therefore I knew, of course, that it would do so again if properly repaired or adjusted.

I finally took the matter up with the manufacturers of the engine, who told me how to adjust the governor to make certain that it was in the right position, and to be sure that it was not sticking.

Several communications passed between us before they began to inquire about the piston valve. This valve, which had solid heads, had become badly worn and was leaking steam in every position. As soon as a new piston was obtained and the valve housing rebored to prevent further leakage, the flickering of the lights stopped.

Eliminating the Chimney

I HAVE before me a picture of a power plant that has no chimney. To me it is a very interesting plant. A fan creates the draft and blows the flue gases through a so-called "smoke washer." There is practically no smoke as all of the solids are taken in suspension by the water. It appears that because of the location of this plant—near combustible property—it is desirable that there shall be no sparks. With the design used sparks are impossible.

A Handy Chart for the Paper Mill Engineer

VERY often the paper mill engineer wants to compute the number of lengths of pipe necessary to make up a pipe line of a given length, the number of lengths to reach a certain depth in a given well, etc., and he has to perform a problem of division. Longhand division is usually a tedious task for every one of us.

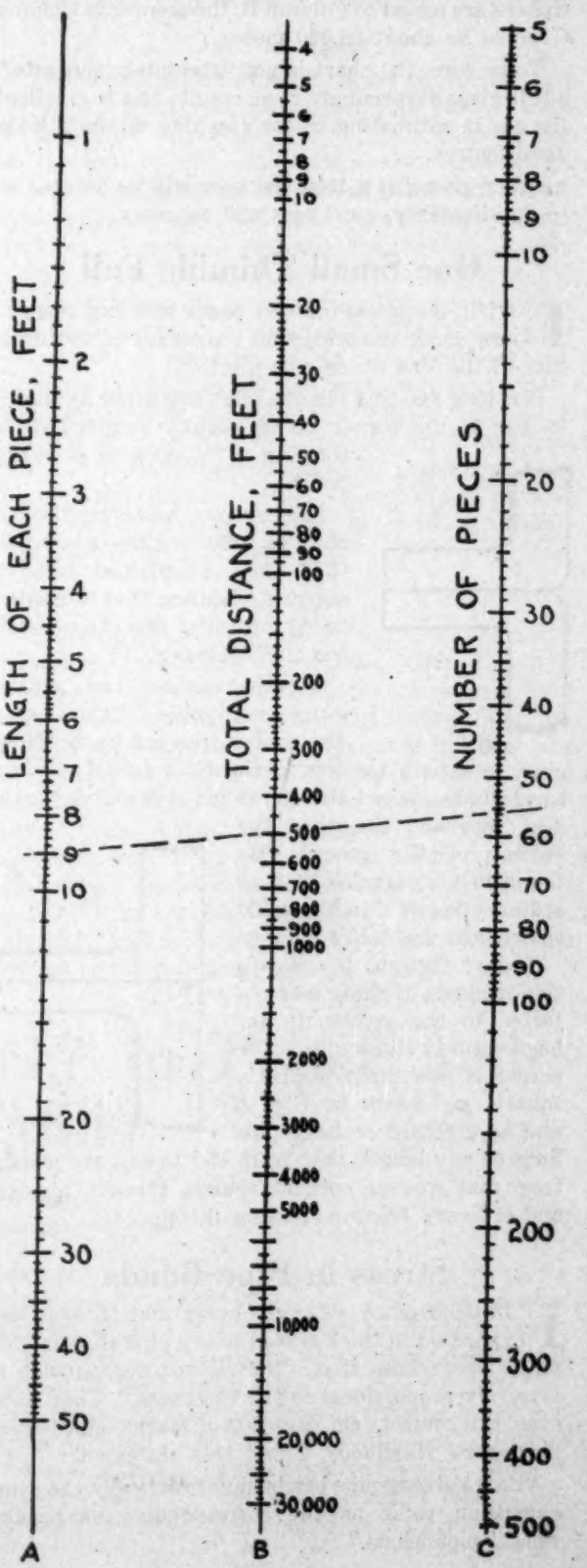
Here is a chart that will instantly give the number of pieces by simply laying a straightedge across the chart. Or, merely stretch a thread across it. The number of pieces of pipe, etc., is instantly given in Column C.

For example, if a pipe line 500 feet long is to be built and pieces of pipe 9 feet long are available, how many lengths of pipe will be needed?

The dotted line running across this chart shows how easily it is done. Simply run the line through 9, Column A, and 500, Column B, and the intersection with Column C shows the answer to be slightly over 55. In other words, about 56 pieces of pipe, pieces of lumber, etc., would be required to make a total distance of 500 feet.

It will be noted that the range of the chart is very great. It will take care of a total length varying from 4 to 30,000 feet. The length of each piece may vary from 1 foot to 50 feet, and it will take care of any number of pieces from 5 to 500.

As a matter of fact, the chart has no limitations whatever. By simply adding two ciphers to any figure in Column B, two ciphers would have to be added to the figures in Column C. Thus, if the total length were 50,000 feet instead of 500, the same dotted line



drawn across the chart would give the answer as, "about 5,600 pieces" instead of 56. Or, if the total distance were 500,000 feet, which means that three ciphers are added to Column B, the answer in Column C would be about 56,000 pieces.

To be sure, the chart is not "absolutely accurate," but it gives surprisingly close results and is excellent for use in estimating or for checking up one's long-hand figures.

After giving it a trial the user will be amazed as to its simplicity, quickness and accuracy.

One Small Thimble Full

IT WILL doubtless interest paper mill engineers to know about the present day accuracy of manufacture of the Van Stone pipe joint.

Not long ago this famous joint was made as shown in Fig 1, the corner being slightly rounded, thus forming a "V"-groove at every point.

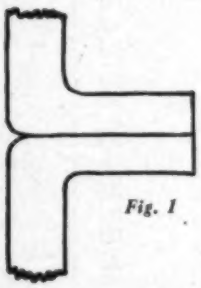


Fig. 1

This groove, however, "looked bad" to some engineers—so bad that they complained bitterly about it, claiming that it created "eddy currents" and caused serious friction losses.

Whether or not the groove caused noticeable friction losses the writer does not know. However, to satisfy his own curiosity, a friend of ours carefully measured one of the grooves one day on a 4-in. pipe and computed the volume of the groove. He found to his surprise that an ordinary lady's thimble would easily hold the entire volume.

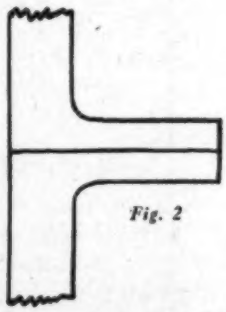


Fig. 2

Today, though, to satisfy the demands of those who objected to the groove, it has been entirely eliminated. The corner is now made perfectly square, as shown in Fig. 2, and as a result we have pipe lines of any length that from end to end are wholly free from grooves, corners, rounds, threads, nipples, and ordinary friction-creating fittings.

Stress in Pipe Bends

IT IS believed by some engineers that there is less expansion in thick-walled heavy pipe than in thin pipe. They claim that, "the allowable expansion is inversely proportional to the thickness." This, however, is incorrect. On page 802 of Marks' Mechanical Engineers' Handbook, I find this statement:

"Extra strong pipe bends have practically the same expansion value as the corresponding shape full weight pipe bends."

I believe this quotation was originally copied from the report which appeared in The Valve World in October, 1915. I haven't a copy of this issue of The Valve World, but that publication seems to be the source of our present knowledge on pipe bends if I interpret Marks' Handbook correctly.

It may be that pipe thickness should be given consideration, but I cannot see why in view of the fact that stresses and strains are always directly proportional to the distance of the fibres from the neutral axis. That being the case I cannot see why the thickness of the wall should enter at all.

$1,000,000,000 Wasted Annually

It is claimed by E. H. Sniffin, Manager of the Power Department of the Westinghouse Electric & Manufacturing Company, that 150,000,000 tons of coal are being wasted annually in our power plants. The total amount being used for power purposes is 300,000,000 tons. He states that it should be cut in half—that where a plant is using from 5 to 10 pounds of coal per kilowatt-hour it should do it with 2½ to 5 pounds per kilowatt-hour.

One hundred and fifty thousand tons of coal at $7.00 per ton is equivalent to over $1,000,000,000.

Inspection—The Waste Eliminator

By R. G. MACDONALD,

Pejepscot Paper Co.

INSPECTION may sound like the term "efficiency" that most mechanics and operating men dislike, but it pays. The following are a few odds and ends contributed toward the elimination of waste in the paper industry for the purpose of assisting in the completeness of treatment of this subject which has aroused so much interest since the war.

Protect Lagging on Pipes

No one questions the value of covering for steam or hot liquor pipes to prevent heat losses and incidentally dollar waste. However, we are not always careful to see that such lagging, after being once applied, remains on the pipes. In the basement and dark places about the mill there is especially great care necessary. With mechanics and operatives busily at work, lagged pipes frequently present themselves as convenient foot rests or ladders upon which to stand in order to reach some object that may not be readily accessible. It does not take very much of this kind of usage to strip the lagging off the pipes and once this has happened heat is again being lost. All lagging should be protected by guards if it is likely to be used in this manner. Frequent inspection will do much to prevent the extension of such losses.

Mechanical Crew Administration

In general the highest average wages for paper

mill employees is paid to the millwrights and mechanics. Such being the case, the best possible use should be made of this class of labor. This can be done in at least two ways: (1) By planning the work definitely: Ordinarily the master mechanic simply indicates to the foreman the work to be done and the latter with his gang sets out to do the job, oftentimes without having in mind any clean cut program of attack or any clearly defined picture of the objective desired. However, a "good mechanic" is not supposed to ask questions but to proceed directly to his task without hesitation. If he does the work wrong he is able to correct it when the inspecting foreman sees it. If he is uncertain in regard to what he should do he can build staging and kill time until he is shown more definitely what he should do. If he does not have the tools with him that he needs, he can go back to the shop and get them or if they need repairing he can take time to do this. All these things may be done while his rate per hour goes on. If a survey is made of the job by someone competent for the task, specifications for the job can be made and thereby much time otherwise wasted may be eliminated. A sketch of the equipment to be made or worked on should be in the possession of the foreman in direct charge of the job. Suggestions as to special tools that may be required should accompany the sketch. (2) The gang should be organized. Someone on the job should be responsible to see that the work is carried through as designed. Every man in the gang should have definite tasks to perform. Without someone on the job directly in charge, the best of gangs can waste much valuable time. Attached to the gang should be one or more helpers to do the unskilled work such as cleaning up, running errands, caring for the large tools supplied by the tool department, and being generally helpful. Too often this kind of work is done by highly paid men when it should be done by men with a much lower pay rate. Helpers of the type suggested should be trained especially in rope and chainfall work as there is much of this to be done. The best source of such labor is of course to be found in the mill yard.

Journal Boxes

The journal boxes on rough, heavy equipment such as we find in barking plants and wood rooms should be frequently inspected. Very often such boxes may be cracked and fail to be conspicuous so that only the closest of observation will reveal the defect. As is frequently the case such boxes seem to stand up very well for the purpose designed, but they are a never failing source of waste with respect to lubricant. The oil quickly finds its way through the crack and lets the bearing remain at the mercy of friction and the penalty is hot bearings. It has been the writer's experience to find such cracked boxes during overhauling periods when the equipment was not being used. The defect must have been present for a long time and had probably been superficially noted more than once by the oilers on the job. Oilers should be carefully instructed to watch and report any irregularities observed in this respect.

Oil Cups

Economy of oil usage has led to the utilization of the oil cup for lubrication purposes. Often the stem, under the cup, through which the oil passes on its way to the bearing is comparatively long and frequently it must be bent. Equipment of this sort may very easily be pushed over or injured without being noticed for a fairly long time. In either case there is little likelihood that the bearing is receiving proper attention and in no way can the alarm be given. Either such accidents here mentioned should be made impossible by carefully designed construction or else everlasting inspection must be employed. **Inspection should be the policy anyway.**

How Accidents Occur in Paper and Pulp Mills

BY J. M. SANDEL
Safety Engineer, National Safety Council

READERS OF THE PAPER INDUSTRY will remember the tabulation of accident records of the members of the Paper and Pulp Section of the National Safety Council. This table was very interesting to members of the section. It showed definite accomplishment, and if a good record was not made, very briefly why it was not possible. If a mill obtained a severity rate equal to the average or not as good as the average, some severe accident took place. The safety engineer of a mill, who had such an experience, and who has been active for many years in the Paper and Pulp Section, was anxious to know how the severe accidents occurred.

Members of the section who participated in this tabulation very gladly gave the story of each accident that occurred where fingers, thumbs, hands and arms were lost. The story of twenty-eight accidents where such losses occurred is given below. Most of these accidents occurred in the machine rooms. Unskilled and semi-skilled employees were involved in

the majority of injuries, although three accidents occurred to machine operators in the finishing department and one man involved was a tour-foreman.

Injuries to Fingers and Thumbs

One member reports an unusual accident. An employee cut his finger on a bleach drum and had the wound dressed. The dressing later became soaked in caustic soda but was allowed to remain on the finger for several days. By that time, the caustic soda had eaten through the flesh to the bone, softening the bone so that it had to be amputated.

One employee was injured by a block thrown with great force from a conveyor. The block was going straight toward his head at the time, but he saw it and raised his hand to save himself. Two fingers and the palm of the hand were badly lacerated and the fingers will be stiff. A more severe injury was prevented by the employee's presence of mind.

One man slipped while on a ladder tightening a valve. He fell to the floor, bending one finger so that it was broken off.

One employee slipped on a wet floor and fell into a pulley from which the guard had been removed for repairs. In another mill, a man slipping on a wet floor lost two fingers when they were caught in the cams of a pump.

Another man using an emery wheel had his finger badly lacerated when his hand slipped onto the wheel.

One machine tender lost a finger when guiding paper through the calender stack. His hand was at the nip when a wad of paper came through which he did not see, and his finger was carried in.

Three fingers were lost because of infections. A cutter man got a steel sliver in his finger, probably from handling shafts; a pipe fitter's helper ran a wire into his hand and did not report the injury in time; and the third employee scratched a finger on stitch wire of a carton and reported to the medical office three days later. Two of these fingers would have been saved by reporting for first aid as soon as the injury occurred.

The tour boss of the wood room was injured in an unusual way. A conveyor made up of chains, and angle iron spaced four feet apart, was giving trouble. He had previously repaired the conveyor and had spaced the angle irons two feet apart. When he placed his hand at a point he could not see, two fingers were injured.

One man tried to lift a heavy suction box alone; it fell and crushed one finger.

The hoisting rope on a sulphite bale hoist became tangled and in trying to straighten it, one finger became caught in the rope and was very badly crushed.

A paper maker was in a hurry to get the machine started after a delay. He neglected ordinary precautions and pinched his finger in putting the weight on a lever.

A machine tender on a towel folder violated all safety instructions as to the safe method of threading paper into a machine. It is a difficult place to guard and the operating organization must depend upon safe employees in order to avoid accidents of this kind.

A folding machine operator was injured when his finger was caught between the disc and revolving shaft of his machine. He was adjusting the machine and looking around the room at the same time. The man was an old employee, and the incident is described by the safety engineer as a case where "familiarity breeds contempt."

While repairing a belt by holding an iron bar under it, the hammer used to clinch the fastening struck an overhead timber which diverted it onto the man's thumb.

While the repairman was replacing a link belt on the socket of a wash machine, another employee started the machine. The repairman's fingers were badly mangled.

A laborer placed on a paper machine as third hand to fill an emergency vacancy, lost two fingers in the calender rolls while feeding the paper from the drier to these rolls.

A 19-year-old youth, using a material hoist, became fascinated with its operation. He rode one of the bales and grasped the hoist cable to maintain his balance. Even in that dangerous place, he was not watching what he was doing, and as he approached the top limit of the travel, his fingers were caught between the sheave cable guard and the cable. Both hands were injured but only one finger was amputated.

A pulley scraper, used to clean off snow and dirt, was not working. An employee used a piece of iron to clean the face of the pulley while it was in motion, but the pulley caught his glove and drew the hand and arm between the belt and pulley.

Hand Injuries

A folding machine operator received a severe cut on his hand when cleaning the perforating knives. The machine had not been operating well during the shift, and the man lost his temper and took a chance.

A machine tender, while straightening paper on a drier felt, got his hand caught between the felt and the rolls.

While cleaning up coal under a belt conveyor, the conveyor caught the hand and badly mangled it.

Arm Accidents

A machine tender was straightening up a leader; his arm was caught between the top drier and top felt. Another was injured in the age-old accident of putting a belt on a running pulley.

Two were injured dressing belts. This was not the regular occupation of one of the injured men. The other was injured at a location where safeguards were provided, but he preferred to do the work in

another way. The belt to be dressed drove the winder drum. Underneath the machine room floor was a well guarded platform for the belt dresser to use. Instead of getting on this platform, the man stretched his arms under a movable belt guard on the machine room floor, with result that his arm was torn off near the shoulder.

There is a method of preventing each accident. Some of them will be obvious to the reader, while others are not so clear because of lack of details. At any rate, it should be possible for the operating organization to obtain all of the facts in the case, and then decide what should be done. Without a complete picture of the location where the accident occurred, which often necessitates a visit to the plant, it is impossible to say what steps should be taken.

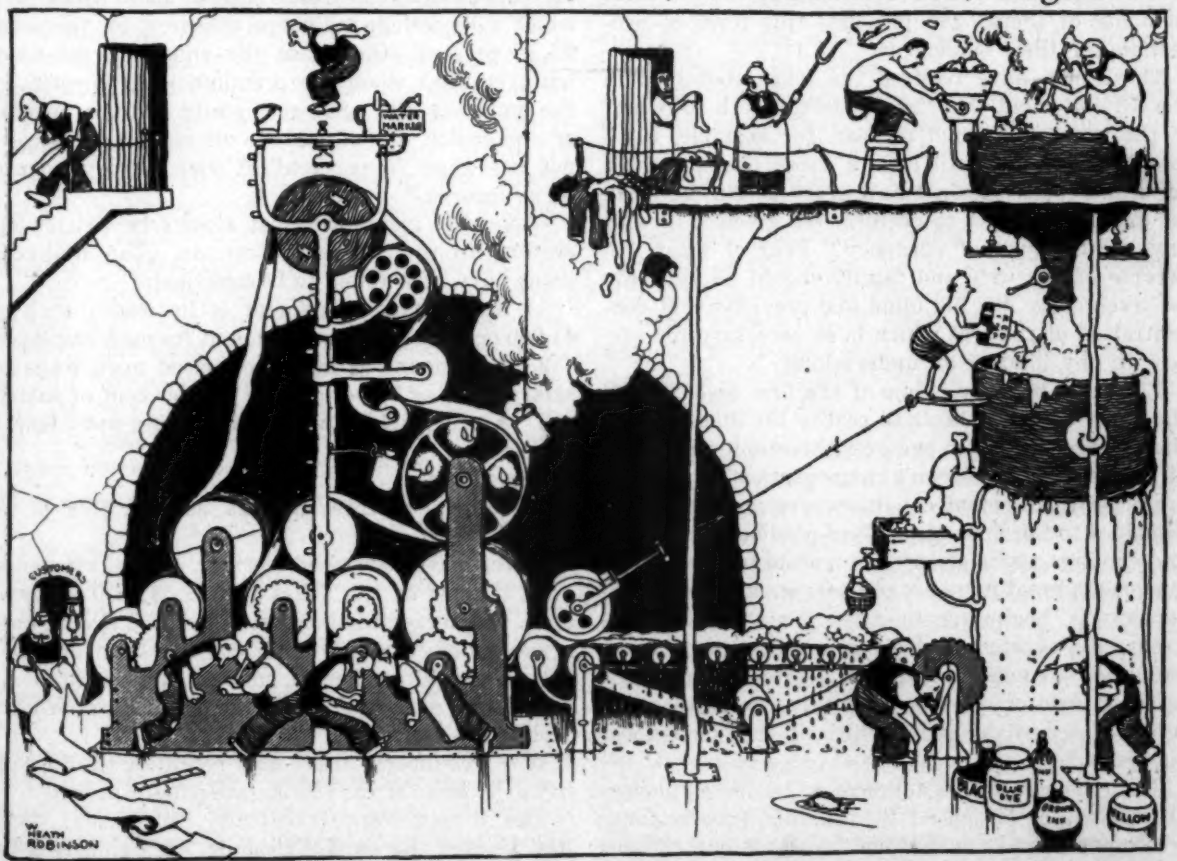
Every manager who sincerely believes in safety will find a way to prevent a repetition of such accidents. It is often possible to do so without interfering with production, and changes in layout or methods of operation will often pay in the end if accident can be avoided.

For Sale

One Ford car with a piston ring,
Two rear wheels, one front spring,
Has no fenders, seat nor plank,
Burns much gas and hard to crank.
Carburetor's busted halfway through,
Engine's missing; hits on two.
Three years old, four in the spring;
Shock absorbers, 'n' everything,
Radiator's busted, sure does leak;
Differential's dry, can hear it squeak.
Ten spokes missing, front all bent;
Tires blowed out, 'tain't worth a cent.
Got lots o' speed, runs like the deuce,
Burns either gas or tobacco juice.
Tires all off; been run on the rim—
But it's a d—— good Ford for the shape it's in.

—With apologies, if any are necessary.

The Latest Thing in Papermaking Machines Submitted for the Consideration of Thomas & Green, Ltd., Wooburn Green, England



Thomas and Green, Limited, recently invited Mr. W. Heath Robinson to submit suggestions for improvements on the existing types of papermaking machines. The resulting ideas as shown in the sketch are extremely interesting and in many ways simplify present practice; but owing to the necessity for exact color-matching which has been for so many years a specialty of 288 Mill, the directors have decided very reluctantly that they must continue to rely upon the more orthodox methods of the leading papermaking authorities.—*The World's Paper Trade Review.*

Group Insurance in the Paper Industry

By WILLIAM F. CHAMBERLIN
Supt., Group Insurance Dept., Travelers Insurance Company

CARLYLE once said, "The man who works with his hands and the man who furnishes work for that man to do must be bound together by ties that are stronger than mere wages." Group insurance is doing more perhaps than any other one thing to bring together the employer and employee on a basis whereby each can understand the other.

It is futile for an employer to talk about production costs and display elaborate cost charts to a man who has constantly before him the mental picture of a wife and family left destitute in the event of his sudden death. Once the future is taken care of through group insurance the question of wages and hours can usually be adjusted on a fair and equitable basis.

That the leaders in the paper business are men of keen intellect, of broad vision and possessed of a sound business acumen is evidenced by the fact that so many of them have provided this form of protection for their employees.

These men have realized the truth contained in the old statement that "as a man thinketh so is he." If the primary instinct of fear, for example, is allowed to develop until it is a great over-powering force that motivates a man's every action, how can we expect that man to perform his given task with any great degree of efficiency? Fear of what will become of the wife and family should he suddenly be taken away fills his mind and prevents that concentration of thought which is so necessary for success in any kind of an undertaking.

Economic security is one of the first essentials to the wage earner if he is to realize his innate ambition for freedom from the ever-threatening nearness of destitution. Workmen's compensation is now generally provided; plant conditions are made safe and healthful to the limit of physical possibility; benefits and savings associations are encouraged; pension systems in great numbers prevail; unemployment insurance is beginning to attract much attention; group life, accident and sickness insurance for the employee is coming very generally to be considered in some form or other by employers as an essential phase of security, having within it the elements of justice.

That the measure is appreciated by the employees themselves is evidenced by the following remarks which were made by the employees of one concern regarding their own group policy.

"This is another forward step on the part of the company and is in keeping with its general policy to keep abreast of the times and in the forefront of commercial affairs; and to do for its employees anything that will tend to make them a happy and contented family."

Group insurance touches the most intimate interests of the life of an employee, adds a substantial amount to his or her estate, and in the place of worry substitutes a consciousness of well-being in the minds of those who are responsible for dependents.

Definition of Group Insurance

The legal definition of group insurance states: "Group Life Insurance is that form of life insurance covering not less than fifty employees with or without medical examination, written under a policy issued to the employer, the premium on which is to be paid by the employer or by the employer and employees jointly, and insuring only all of his employees, or all of any class or classes thereof determined by conditions pertaining to the employment, for amounts of insurance based upon some plan which will preclude individual selection, for the benefit of persons other than the employer, provided, however, that when the premium is to be paid by the employer and employee jointly and the benefits of the policy are offered to all eligible employees not less than 75 per cent of such employees may be so insured."

Group life insurance must always be written according to some definite formula. The following plans have been found to be practical:

1. An unchanging amount of insurance, such as $1,000 or some other fixed amount for each employee.
2. An amount of insurance based upon wage or salary, such as 75 per cent or 100 per cent of salary.
3. A progressive amount, depending upon length of service.

For example:

At the end of three months' service, $500 of insurance.

At the end of one year's service, $750 of insurance.

At the end of two years' service, $1,000 of insurance, and thereafter increasing by $250 a year until a maximum of $1,500 or $2,000 has been attained.

A short waiting period, such as three months, six months or one year, serves to eliminate the class termed "floaters."

It will be interesting to note definitely the formula in use by some of the well-known paper concerns.

The Bryant Paper Company, Kalamazoo, Mich., has adopted the service formula, each employee being insured initially for $500. A $100 increase is effective on each anniversary date of employment until the maximum of $1,000 is attained after 5 years of continuous service.

The Continental Paper Company located at Bogota,

N. J., has divided its employees into two classes. Members of class one, which includes married employees, widows, widowers, and divorcees, are insured under the $500-$1,000 service formula. The increase amounts to $100 each year until the maximum of $1,000 is reached at the end of 5 years of service. Members of class two, which includes all other employees, are insured each for $500 flat.

The well-known Eastern Manufacturing Company has provided for a waiting period of 6 months before an employee becomes eligible for the initial amount of insurance of $500. This amount is increased $100 each year until the maximum of $1,000 is attained after 5 years of continuous service.

The S. D. Warren Company of Westbrook, Maine, has an employees' association known as the Cumberland Mills Mutual Relief Association, and each member of this organization is insured for $1,000. The S. D. Warren Company pays 50 per cent of the premium, the employees contributing the other 50 per cent.

The Whiting-Plover Paper Company has insured its employees under a very long service formula. Each employee is provided with a $500 policy on the date of his employment. This amount is increased $100 each year up to $2,000 with subsequent increases of $50 effective each year thereafter until the maximum of $2,500 is attained after 25 years of continuous service.

A few other well-known paper concerns which carry group insurance are: The Dominion Envelope and Carton Company, the Franklin Board and Paper Company, the Kalamazoo Vegetable Parchment Company, the Allied Paper Mills, the W. B. Oglesby Paper Company, the Orono Pulp and Paper Company, the Sherman Paper Company, Inc., the Tissue Company, the Upson Company, the Watervliet Paper Company.

The Samuel L. Langston Company and the Bagley Sewall Company, well-known concerns manufacturing paper machinery, also have group policies.

There are very many names of other paper concerns that I could mention—names with a significance of recognized reliability and public favor. With but few exceptions all of these companies employ the service formula upon which to base their group life, accident and sickness insurance. The exceptions to this have been arranged for group insurance in flat amounts, that is, the same amount of insurance given to all employees regardless of length of service or other conditions. Employers are, as a rule more inclined towards the service formula, because it recognizes past loyalty and rewards length of service as time progresses. It is, moreover, an inducement for employees to remain with a company when they have built up for themselves through steadiness of employment a life insurance policy such as it would be difficult for them to come into possession of by making a change of employment.

Promotes Safety Idea

Group insurance, where it is carried by an insurance company equipped to render a highly developed service, co-operates with the assured in the attainment of the safest possible working conditions through a service of inspection. The service rendered by such an insurance company would have the effect of clinching what work has already been done along safety lines among paper concerns and encouraging it where activity in this regard has not been so marked.

Employers have been in the past much gratified with the marked reduction of accidents and the elimination of hazards that have been effected through the co-operation of the engineering and inspection service rendered to those employers who carry group insurance in one of the few insurance companies that lead in this line. A service in personal health is usually at the disposal of group insured employers. Health talks are given by the insurance company doctor on whatever subjects are pertinent to the particular industrial corporation. With two or three companies of high standing there is an automatic service of a distribution of health booklets for employees and other booklets dealing with industrial policy and technique for distribution among foremen and employers themselves.

It is the avowed object of those perpetuating the use of group insurance to make as its ultimate influence good will of a three-fold nature—from the employer to the employee, from the employee to the employer, and a mutual good will between both parties and the insurance company. That this effect is actually accomplished one hundred times out of every one hundred establishments where I have had the happy experience of assisting in the arrangements for group insurance, is a statement corroborated by all the employers with whom I have in this way come into contact.

The fifty-four members of the graduating class of 1923 in chemical engineering, University of Toronto, are advertising the offer of their services to Canadian manufacturers under the slogan, "Keep Trained Canadians in Canada." Each man's training during the four years of his residence at the university cost $9,000, according to the advertisement, including $4,000 for four years loss of wages, $4,000 for living expenses and fees, and $1,000 cost to the State. Their services will cost manufacturers "the same wages to start with that you would pay untrained man-power; then what you have found us to be worth."—The Nation's Business.

Three men were working on the stones of the great St. John's Cathedral. They were asked, "What are you doing?" One replied, "Getting $5.00 a day." The second worker said: "Chiselling this rock." The third one answered: "Helping to build this Cathedral."—Straight Matter.

Power Costs in the Paper Industry

By EDWARD P. GLEASON
Chief Engineer, Nekoosa Edwards Paper Co.

IN MODERN paper manufacturing three groups are responsible to the management: the Superintendents, the Cost Accountants and the Engineers. All are essential and real co-operation is needed in these days of rapidly changing methods and conditions.

Formerly the superintendent was a "Jack of All Trades"; in many cases spending more time on purchasing, labor, power plant and machine shop problems than in the real operation of the paper mill.

In the modern mill the superintendent is a paper specialist, needing all his time for this work. He leaves his labor problems with the employment department, his steam and power

ITEMS	PORT EDWARDS		NEKOOSA	
	SEASON	MONTH	SEASON	MONTH
OPERATING CHARGES:				
Coal 21975	166864.08	20488.00	24417 191039.01	21330.00
Hog 11777	14955.15	1756.29	18998 38344.45	3080.00
Freight on Hog	5191.76	590.11	-	
Switching	281.10		-	
Labor	19314.82	1876.78	21243.90	1738.13
Repair Labor	6860.74	781.98	3955.48	884.01
Repair Material	11985.80	2217.53	18945.57	3030.40
Belting	353.89			
Lubricants	68.13	6.00	76.58	4.88
Lamps	118.67	24.79	207.22	16.54
Supplies	241.12	44.09	263.10	5.58
TOTAL OPERATING CHARGES	229736.94	27897.08	288094.91	28487.91
FIXED CHARGES:				
Taxes	5296.94	572.06	4272.79	823.86
Insurance	806.60	-	848.60	-
Burden	4545.41	454.09	5722.92	548.30
Depreciation	9567.32	722.24	9287.24	772.82
TOTAL FIXED CHARGES	19716.25	1450.09	22196.27	1881.99
Total cost of Steam	249452.19	29347.15	290291.18	30339.90
Steam delivered M Lbs.	340,121	34,522	470,116	44,250
Cost of steam del. M Lbs.	.7166	.8501	.6176	.6856

BOILER ROOM OPERATION.

Tons coal used	21,973	2,292	24,417	2,370
Tons Hog used	11,777	1,036	18,998	1,540
Total Equivalent Tons Coal	24,517	2,561	29,140	2,755
Cost per ton Coal	7.80	9.00	7.80	9.00
Del.value of coal		8.43		8.45
Cost per Ton Hog	1.43	1.69	1.87	2.00
Lbs.Steam Generated Thru 212 Degrees F.per Lb.dry coal	8.45	8.66	9.7	9.9
Boiler Room Efficiency	61.5%	62.5%	71%	72%
Coal Analysis: B.T.U.		13321		13072
Ash		7.89		6.66
Moisture		4.99		6.11

Chart 3
Port Edwards and Nekoosa boiler houses—analysis of steam costs

problems with the engineering department, and depends more and more on the cost accountant and the engineer to help him reduce his cost of production.

The old time cost accountant was a bookkeeper, seldom seen in the mills, and a man who thought in terms of dollars only. The modern accountant should leave off the word "Cost," as he should think in terms of standard units as well as dollars. He should be in the mills daily and should follow materials as well as costs in the manufacturing processes.

The value of the dollar has always been variable and its use has made much comparative cost data misleading or worthless in many cases. Formerly the management was satisfied with steam cost in dollars per ton of paper. Now he wants pounds of steam per pound of paper as well.

The old time engineer was a "Rule of Thumb" man in dirty overalls; without instruments or facilities for getting accurate data or costs on his power plant. No one thought of measuring steam to mill departments or of power economy as now understood.

The modern engineering department has instruments and facilities for getting accurate measurements of steam, water, etc., and with the help of the accountants can get good cost data. The engineer must outline what reports are needed and is responsible for the data turned in. The accountant should get this data in proper form, work out costs and should study results with the engineer and the management.

Note: Paper read before the annual meeting of the Cost Association of the Paper Industry, held at Cleveland, May 25, 1923.

We would like to see the accounting department have regular monthly meetings on costs of production and methods of reducing same. It should be part of the accountant's work to see that the data that he so carefully works out is really used to best advantage. The engineer is interested in costs but he can in no way control wages, coal prices, etc. He must compare his and other boiler plants from time to time in terms of standard units such as pounds of steam per pound of coal. As the engineer is the only one who can reduce the boiler room costs he must have his comparative data in good form and it is part of the accountant's work to provide these forms and keep the records constantly before the superintendent and engineer as well as the management.

We will show you how some of this work has been carried out in the plants of the Nekoosa Edwards Paper Co.

TABLE 1

Paper Mills	Percent
Labor	28.39
Repair labor	5.78
Repair materials	3.62
Roll and plates	0.18
Belting	0.64
Supplies	0.51
Lamps	0.13
Machine clothing	10.24
Lubricants	0.34
Power (steam)	36.27
Power (electric)	10.72

GENERATING COST OF ELECTRIC POWER:	SEASON TO DATE K.W.			MONTH OF NOV. K.W.	
Repair Labor	95.85			26.41	
Repair Material	484.74			-	
Engine Room	1948.83			207.27	
Lubricants					
Supplies					
Lamps					
Steam Power	24745.57			4403.85	
Taxes	818.85			85.42	
Insurance	4.40			-	
Manufacturing Burden	419.36			41.90	
Depreciation	779.48			66.84	
TOTAL COST OF ELEC. POWER GEN. 1853998	29031.94	.01997	180838	5061.07	.0275

930.28 Hrs.

Chart 5—Steam Turbine

1—Hours run	330.25
2—Per cent of hours run	53
3—Average load K. W.	585
4—Average load per cent capacity	58.5
5—K. W. Del. (Gen. loss)	180,810
6—Total steam 1,000 lbs.	5,470
7—Lbs. per K. W. H. Inc. Cond.	30.4
8—Lbs. K. W. H. (turbine only)	24.6
9—Steam cost to date (1,000 lbs.)	.70
10—Steam cost K. W. H.	.021

TOTAL ELECTRICITY FROM:

Centrella	10537397	94029.46	.00910	884879	7913.87	.00898
Nekoosa Hydro	7998567	74254.52	.00788	701880	6021.75	.00868
Steam Turbine	1053998	27031.94	.01997	180838	5061.07	.02796
	20190062	195315.93	.01017	1846991	19987.69	.01077

DISTRIBUTION OF ELECTRICITY:

Grinder Room J.R. (Primary) Secondary	1048518	13914.82	.00786	107800	880.84	.00839
J.R. Pulp	880199	8481.07	.01020	89849	861.39	.01111
J.R. Paper	8648868	87180.89	.01020	874181	8744.84	.01111
P.M. Sulphite	8467493	85865.98	.01020	897232	8921.97	.01111
Wood Preparing-P.M.	5880280	59778.12	.01020	59930	654.48	.01111
Nekoosa Paper	8098048	81734.20	.01020	810686	8701.91	.01111
Nekoosa Pulp	885721	8942.21	.01020	87960	910.80	.01111
Nekoosa Sulphite	9947972	20708.14	.01020	986192	8409.65	.01111
Nekoosa Kraft	10846268	17420.20	.01020	191911	8125.19	.01111
Wood Preparing-Nek.	10021187	10448.52	.01020	98900	931.67	.01111
	20190062	195315.93	.01017	1846991	19987.69	.01077

TABLE 2

Sulphite Mills	Percent
Preparing Wood	23.00
Labor	16.70
Repair labor	3.45
Repair materials	6.39
Screen plates	0.19
Belting	0.17
Supplies	0.40

DEPARTMENT	PRODUCTION IN TONS		PROCESS STEAM IN M LBS.		HEATING STEAM IN M LBS.		TOTAL STEAM IN LBS.		LBS. STEAM PER LB. PRODUCT		STEAM POWER COST PER TON PRODUCT		MONTHLY ELECTRICAL DISTRIBUTION K.W.H.	K.W. PER M LBS. PRODUCT
	SEASON	MONTH	SEASON	MONTH	SEASON	MONTH	SEASON	MONTH	SEASON	MONTH	SEASON	MONTH	USED	
John Edwards Paper Mill	14595.99	1245.30	165358	12618	3403	2070	168561	14688	5.77	5.89	8.39	10.10	274,161	110.0
John Edwards Gr.Wd.Mill	11619.82	936.68	-	-	3404	2071	3404	2071	-	-	-	-	167,349	89.3
Port Edwards Sulphite	8790.78	922.93	119907	9077	1848	1848	121755	10925	6.92	5.91	9.87	10.13	297332	161.1
Nekoosa Paper	25916.44	2227.60	263781	24781	1815	1871	265596	26652	5.12	5.84	6.5	8.08	520656	116.8
Nekoosa Groundwood	4161.32	226.08	-	-	882	610	882	610	-	-	-	-	27960	61.8
Nekoosa Sulphite	12811.51	1067.90	1277.21	8789	536	355	128257	9144	5.00	4.32	6.13	5.94	224192	106.0
Nekoosa Kraft	7329.29	904.80	690.20	7524	411	303	69431	7827	4.73	4.32	5.83	5.93	191911	106.0
Steam Turbine			46535	5470	-	-	46535	5470	-	-				
Sold Outside From Port Edwards			7776	1368			7776	1368						
From Nekoosa			5950	625			5950	625						
Wood Preparing, Nekoosa														83900
Wood Preparing, Port														56930

Chart 4—Steam and Electrical Distribution

DEPARTMENT	PRODUCTION IN TONS		PROCESS ELECTRICITY IN K.W.		K.W.PER M. LBS. PRODUCT		ELECTRICAL COST PER TON PRODUCT	
	SEASON	MONTH	SEASON	MONTH	SEASON	MONTH	SEASON	MONTH
J. E. Pulp Mill	2209.06	823.14	372840	139757	84.3	84.8	1.42	1.29
J. E. Paper Mill	4326.43	1510.11	896228	298953	103.5	98.9	2.35	2.09
P. E. Sulphite Mill	4144.62	1648.15	1232142	464915	148.6	141.0	3.33	2.97
Wood Preparing, P. E.	92.19	36.23	208610	70090	22.6	19.3	.25	.20
Nekoosa Paper	6920.96	2381.10	1951082	687116	140.9	144.2	3.18	3.03
Nekoosa Pulp Mill	183.00	75.44	84230	44230	230.1	293.1	5.09	6.18
Nekoosa Sulphite Mill	3262.61	1023.80	694206	223794	106.3	109.3	2.42	2.30
Nekoosa Kraft Mill	2697.00	1035.30	574477	226308	106.3	109.3	2.38	2.30
Wood Preparing, Nekoosa	132.42	45.23	227800	79100	17.2	17.4	.19	.18

Chart 6—Electrical Distribution

DEPARTMENT	STEAM COST PER UNIT		ELECTRICAL COST PER UNIT		WATER POWER COST PER UNIT		TOTAL POWER COST PER UNIT	
	SEASON	MONTH	SEASON	MONTH	SEASON	MONTH	SEASON	MONTH
J. E. Paper Mill	8.59	7.96	2.35	2.09	.90	.91	11.84	10.96
J. E. Groundwood Mill	2.18	2.30	1.42	1.29	5.89	5.43	9.49	9.02
P. E. Sulphite Mill	9.31	8.30	3.33	2.97	-	-	12.64	11.27
Nekoosa Paper Mill	7.20	6.87	3.18	3.03	.59	.52	10.97	10.42
Nekoosa Groundwood Mill	7.98	6.51	5.09	6.18	5.23	5.94	18.30	18.63
Nekoosa Kraft	5.56	5.33	2.38	2.30			7.94	7.63
Nekoosa Sulphite	5.56	5.33	2.42	2.30			7.98	7.63
Preparing Wood, J.E.					.45	.45	.45	.45
Preparing Wood, P.E.			.25	.20			.25	.20
Preparing Wood, Nekoosa			.19	.18			.19	.18

Chart 7—Power Summaries

Lamps	0.10
Lubricants	0.14
Power (steam)	36.25
Electric power	11.65
Frt. on sulphite	0.49

Tables 1 and 2 show conversion costs in paper and sulphite mill for one year. The figures show that steam and electric power make up nearly 50 percent of the total conversion cost—surely items worthy of the best efforts of all concerned.

Divisions of Power Cost

(A) Steam Power.
(B) Electrical Power.
(C) Water Power.
(D) Power Cost Summary.

(A) Steam Power Costs

(1) Boiler Room Costs.

(2) Distribution Costs.

(1) Chart 3 shows summary of boiler room costs and efficiency. This condensed sheet shows operating charges, fixed charges and totals for season and month ending in dollars per pound of steam delivered by boiler room. The standard units are also given and are summed up in pounds of steam per pound of combustible and percentage efficiency. Coal analysis is also given. Note that this summary is designed to give current costs and permanent comparative data and should satisfy both the management and the engineer.

(2) Following steam into the mill we have Chart 4, showing steam distribution. Here again we show dollars and standard units, subdivided into process and heating in an effort to interest the superintendent in his heating load.

(B) Electrical Power Costs

(1) Electrical power production costs are shown on Chart

5 and summarized in dollars per K. W. H. In the hydro electric plants the efficiency summary does not appear. This is checked by the load dispatcher hourly from the readings of gate openings on the water wheels, and by the periodic inspection and cleaning.

(2) Electric distribution is shown on Chart 6. We again emphasize the cost in dollars and the standard unit of K. W. H. per 1000 lbs. product.

(C) Water Power

We have not developed this to the detail considered necessary. It is divided by horse power rating on water wheels and days run. It should be stated in horse power hours per unit of production.

(D) Power Cost Summary

The power cost summary, Chart 7, is in dollars because you cannot add pounds of steam and K. W. H. This shows cost of steam, electricity and water power as well as the total cost per unit of production for each mill.

NOTE: For Graphic Method see "Steam Economy in Paper and Pulp Mills." Technical Ass'n Papers, April 10, 1923.

How Felts and Jackets Are Made

WALTER S. ROONEY

Albany Felt Company

THE little talk I have been asked to give you on felt making is the result of a co-operative idea that has been under consideration for some time. Comparatively few paper mill men have had the opportunity of visiting felt mills and seeing how felts are made, and for the benefit of those who could not get to the mill, it was decided to bring the mill to them, as I am doing tonight.

My entire object is to give a comprehensive idea of the many operations through which the wool must pass before it emerges into its finished state, and to give you an idea of a few of the problems of the felt maker.

I feel sure after we have gone through the miil and you have seen the twenty-two operations through which the raw wool passes before it gets to the shipping door that you will agree that it is a long technical process and one that should not be hurried. If the felt manufacturer is really to do justice to his part of the job you will see the importance, I am sure, of anticipating your orders as far in advance as possible, say from six weeks to three months, and at the same time allowing the felt manufacturer to make a reasonable quantity of felts at one time.

I am going to begin with the sheep, for in the first place, we have to know something about sheep and the wool characteristics of the different breeds.

Each sheep breeding community produces sheep of different characteristics and varying grades of wool. One of the principal grades of wool that is used is known as full blood, which wool is used in pickup and similar felts. A sheep with three-quarters blood produces wool such as used in Superfine Press Felts. The wool of the half-blood is used in all kinds of fine Fourdrinier wet felts. For the common Fourdrinier wet and cylinder wet felts we use mostly three-eighths and one-quarter blood wools. Only the wool from healthy animals should be used, otherwise the crop will be of inferior quality. In felt making, as in paper making, a scientific blending of raw materials is requisite and the wools from Australia, Canada, New Zealand, South Africa, the British Isles, South America and our own country are used to get the right blends.

The sheep are shorn by mechanical clippers, in what we might call a barber shop for sheep.

The wool arrives at the mill in large bags and is unloaded into the storeroom, from where it is taken to the sorting room.

The first step in the manufacture of felts is the sorting of the wool. The wool sorting room is arranged to get the full benefit of the north light and you will notice in the accompanying illustration the sorting tables are all placed before a window to get the greatest light, for different portions of each fleece supply wool of various lengths and fineness which must be separated from each other, and the best light is none too good. The fleece is divided into about five sorts, the different lengths and qualities being used in felts of various kinds. The coarse and dirty wool from the lower extremities of the animals is discarded as wholly unfit for paper makers' felts and jackets. The sorting operation requires the same good judgment that a beater man must have in telling about the length of stock. In fact, if you will look sharply you will find that this room has no electric lights whatever, as no sorting can be done by artificial light. In view of this, you can readily appreciate the skill that is required in this work.

The sorted wool is always inspected by the boss sorter and after his approval it is dropped through traps in the floor into various bins in the scouring room.

Special Cleaning Process

The wool taken from the bins is fed onto an apron by hand and is opened up and dusted by a special machine as it passes into the washer. The washer is very different from anything you have in a paper mill. It has four separate vats or bowls. The first three contain a chemical solution for scouring, and the last is furnished with filtered soft water for cleansing. All tanks are kept at just the right temperature by thermostatic control. The wool is raked forward slowly by long brass fingers and conveyed automatically from one vat to another, passing each time through a wringer before entering the next bath.

The water used in the solution is all filtered in our plant and treated mechanically to soften it. In fact, all water used in the mill for manufacturing purposes is chemically treated. The capacity of this softening plant is more than 150,000 gallons a day. As the clean, moist wool emerges from the last vat it is blown to the dryer.

The chamber of this machine is kept under close thermostatic control and the warm air is forced through the fibers until they are thoroughly dry. The first compartment is held at a fairly high temperature by this thermostatic control and each succeeding compartment is held by a lower temperature until the last one is reached, which is at the temperature of the room. After passing through this dryer the wool is blown into large storage bins as clean and fleecy as can be imagined. From these bins the various qualities are drawn to the blending room, where in a carefully predetermined proportion they are mixed together and sent along to the picker. As a felt mill ordinarily makes some one hundred and fifty different styles of felt, in order to suit the varied requirements of paper makers as to speed of machinery, weight of product, and character of finish, it will be appreciated that the blending of wool is an important part of the scientific making of felt.

The wool is next fed into the picker, which combs out all tangles and separates the fibers from one another prepatory to carding, at the same time automatically moistening them with a special emulsion. The capacity of one of these machines is about 10,000 pounds per day.

From the picker the wool is again blown through large tubes to the cards, which comb out the fibers to lie parallel, preparing them for spinning. What is known as the "first breaker" is the first operation in carding.

From the first breaker the wool passes to the second breaker, where the whole process is repeated.

From the second breaker it goes to the finisher and is taken off in spools in a rope-like form called "roving." Perhaps this carding operation may seem to you to be a very simple one, but I think your opinion will change when I tell you that this is a process demanding the finest accuracy. These strands of roving must be made to weigh within three grains of a specified weight per hundred yards, and a grain is one seven-thousandth of a pound.

The large spools are taken from the cards to the spinning mules to be spun. Here is shown a general view of the spinning room.

The wool is unwound from the spools and spun and wound on to the cops. In every case, before the spinning of a new lot is begun, a careful and accurate test is made, as the yarn must be of the required tensile strength before the spinners are allowed to go ahead.

The bobbins as they come from the spinning mules are much larger than can be placed in a shuttle, so those containing filling yarns are rewound under tension to about half their original size. The left cop is the warp bobbin and the one on the right is the shuttle bobbin, containing the yarn transferred from the warp bobbin. Each of these contains exactly the same amount of yarn.

Yarns to be used as warp are then wound onto spools. These spooling machines, too, are quite delicately adjusted, for if one thread should break, the entire machine stops in-

Note: This is the address which Mr. Rooney has been giving before the various divisions of the American Pulp and Paper Mill Superintendents Association.

stantly. All of this yarn is unwound from the bobbins to the spools at a uniform tension, nothing is left to chance.

From the spools the yarn is then wound onto a huge drum known as the dresser and is then transferred to the beams of the loom.

The warp is then drawn thread by thread through the "heddles" of the harnesses which control the design of the weave and then through reeds which determine the number of threads to the inch. This number is dependent upon the amount of shrinkage which is calculated to result from the fulling process.

The size of felt looms varies from 48 to 400 inches. From the foreground looking back you can see the gradual increase in the width of these looms.

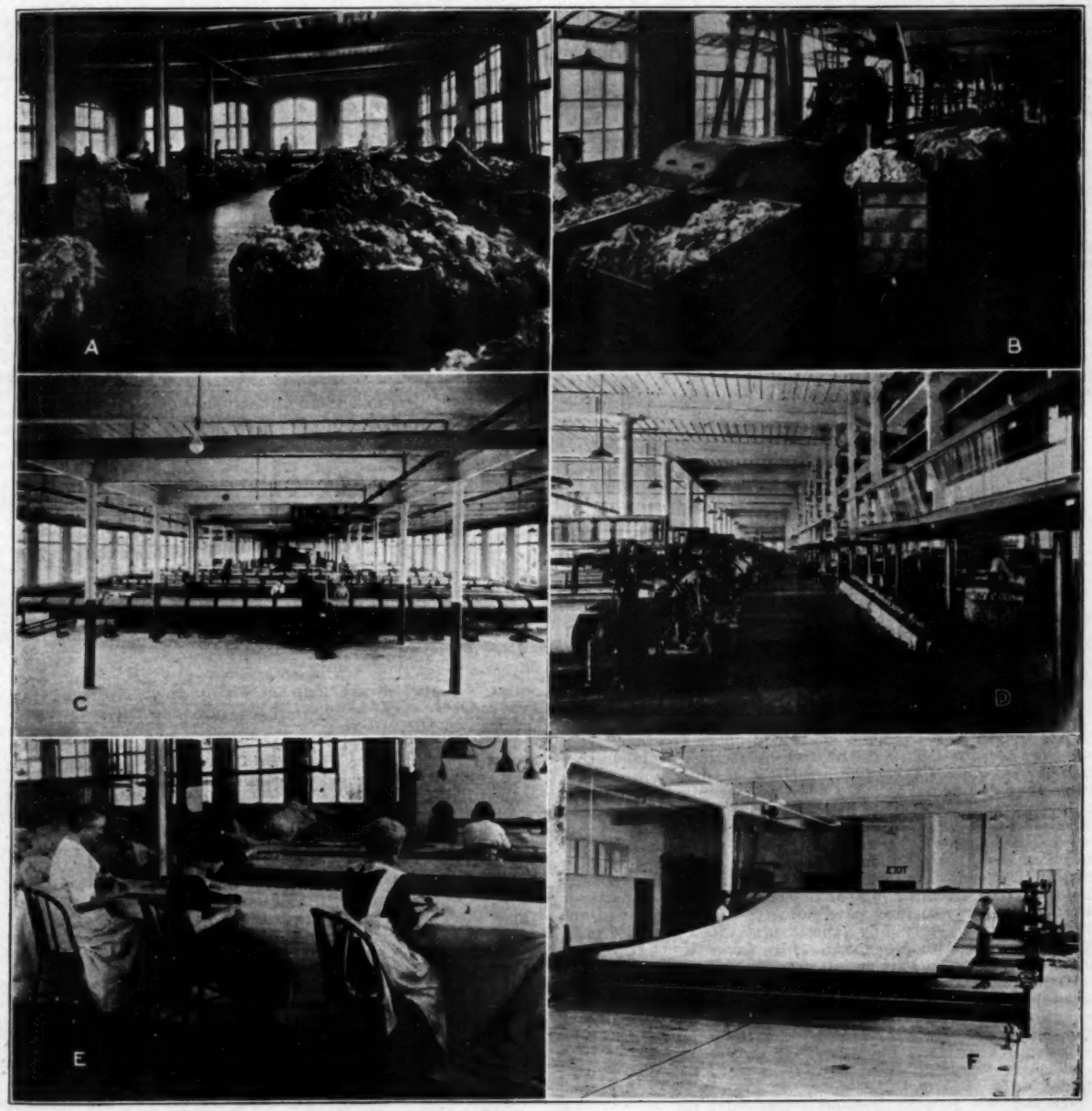
After the cloth is woven the right lengths, except in the case of felts that are made endless, it must be burled and joined.

Girls sitting at the tables, called burlers, remove all ends and minor imperfections. Each girl first inspects the felt very carefully on her table and then takes it to the perch where she looks through it toward the light, to be sure that nothing has been overlooked. The lighting facilities, both natural and artificial, are the best that windows, high-powered lamps and white ceilings can afford.

The Work of the Joiners

To better convey to you the work of the joiners, I will show you a closeup of the joining table. The ends of the felt to be joined are brought together and matched. These matched ends are tied and drawn through the felt in alternate directions. These threads are then looped back into the felt to give added strength and the ends are sheared off and the operation is complete. It is nothing unusual to have a girl working five to eight days each to join one felt. Some of the Super Plate Press felts have as many as forty threads of warp to the inch and in a 150-inch felt it can easily be calculated how many threads a joiner must tie and weave into the felt to affect a join.

Next the felts go to the finishing room. Here they are moistened uniformly with fulling compound and started in the various types of fulling mills. In what is known as the



A—The sorting of raw wool
B—Wool scouring department
C—One of the spinning rooms
D—One of the weave rooms
E—The joiners
F—Close up of one of the nappers

rotary type, the felts run between rollers, which create a heat and this heat with the fulling compound produces shrinkage. Another type of fulling mill is called the "kicker," and in this mill the felt is pounded by two heavy bumpers running alternately with the idea of working the felt down to the size ordered.

After the fulling operation is completed, the felts are taken to the measuring frames to make an added check to be sure that the sizes are right. The felt is run over this frame in a very similar manner in which it runs on a paper machine.

After this the felts are taken to the washers, where they are well scoured in warm water, followed by cold water, which is finally extracted by a centrifugal process. At this stage there is no nap on the felts and they look like old-fashioned home spun blankets.

In the accompanying picture you see a Roller Teasel gig at work combing up the fibres of the moist felts. On this machine it is possible to detect slight faults which might have previously escaped notice. Any felts which have faults beyond correction have to be disposed of as by-products.

When the napping is completed the felts are run over large dryers which resemble very closely the dryers of a paper machine. In this operation the felt makes a sort of a trial trip which again offers an opportunity for detecting flaws.

Even felts that run properly over the dryers are subjected to a final inspection over a perch by experienced judges.

Every foot of felt is carefully gone over, and looked through toward the light the way you paper men examine samples for formation. A complete record is kept in each department of every single felt, so that in case of a complaint from a customer, exact data is available with which to check up every step in the manufacture. No stone is left unturned to make shipments perfect. When you have particularly good results from a felt, you can all see how important it is to give us the felt number so a duplicate can be supplied. The same care is used in packing and shipping as in manufacture. Our enemies, the moths, must be reckoned with, and so each felt is liberally showered with flake naphthalene before packing.

We have told you about the physical side of felt making, but in the chemical laboratory many different and often difficult problems are worked out. Experts determine by special contrivances of our own the porosity of each felt and our designer is constantly working over special problems of weaving which shall be best adapted for various requirements.

The manufacture of couch roll jackets requires great care and the weave is of greatest importance so that the jacket will have both the necessary smoothness and thickness and be firm in structure. The jacket is woven in tubular form. Many threads must be woven to each inch. These tubes are generally woven in sufficient lengths to allow several jackets in the same diameter to be cut from one piece when it is finished. In finishing jackets, all sizes are fulled to a somewhat smaller diameter than the roll on which they are to be used.

The jackets are then dried in a special vacuum dryer which does in four hours what used to consume six days. As you know, the jackets are stretched while wet, sufficiently to allow them to be slipped over the roll. After being dried on stretchers the size is held until they are wet again after sliding onto the roll, when the jacket endeavors to shrink to its original size, thus fitting like a glove onto the couch roll.

American Pulpwoods

The Suitability of Various Species of American Woods for Pulp and Paper Production*

By SIDNEY D. WELLS

Engineer in Forest Products, Forest Products Laboratory, Madison, Wisconsin

THE Forest Products Laboratory, Madison, Wisconsin, has in the past received frequent requests as to the suitability of various woods for pulp and paper production and it has therefore seemed advisible to prepare for publication some of the available data on this subject. The laboratory has carried on an extended investigation over a period of more than ten years and has collected experimental pulping data on practically all the possible species of American pulp woods. These data, insofar as the chemical pulps are concerned, have mainly been obtained from experimental cooks made at the Forest Products Laboratory, Madison, Wisconsin, in 100-pound semi-commercial digesters and from studies made on the resulting pulps. It has been found, however, that the general cooking conditions, yield, bleach, consumption, etc., as determined by experimental trials for pulp made from any given wood, compare quite favorable with the results obtained in commercial practice. The data for the various mechanical pulps were obtained from the experiments carried on at the ground-wood laboratory, Wausau, Wisconsin, where a commercialized grinder equipment was installed by the Forest Products Laboratory in co-operation with the American Paper and Pulp Association.

The yield of pulp from any given wood depends directly upon the specific gravity of the wood or weight per cubic foot and the pulping method employed. By varying the severity of the pulping treatment both yield and bleach consumption are changed. For example, white spruce sulphite pulp prepared for the manufacture of newsprint paper, would show an entirely different yield and bleach consumption from bleached white spruce pulp prepared for use in a white bond paper. It is, therefore, evident that the character and use of the pulp will largely decide the severity of the cooking operation. Certain woods, such as western larch, containing a high percentage of galactan, which is water-soluble, will show a decreased yield by either mechanical or chemical pulping.

Pulping data have been given for woods such as red and white oak, white ash and certain other woods not because we consider these species suitable for pulp purposes, but because the information was available. Many wood-using plants produce considerable tonnage of slabs and mill waste of woods not especially suitable for pulp production, and are interested in a possible outlet for this waste. In some cases, at their direct request, pulping trials have been made on woods known to be unsuitable for pulping purposes. Pulping data on trials made at the Laboratory have been included for two foreign woods, viz.: Norway spruce and Scotch pine which are quick growing woods of possible interest for planting purposes. The various woods have been listed, giving the official name as recognized by the Forest Service, also the common names in use and the range covering the growth of that particular species. This information has been taken directly from the "Check List of the Forest Trees of the United States," by George B. Sudworth.

In considering the pulping and other data given for the various woods, attention is drawn to the following points:

1. The weights of wood given are for bone-dry material per solid cubic foot. This is obtained by multiplying the specific gravity of the over-dried wood based on the green volume by 62.3 lbs. (the weight of a cubic foot of water).

2. The fiber lengths as given are the average of all the available data taken from the Forest Service investigations and from other sources. Many of the measurements given are the results of averages of thousands of determinations; in other cases from only a few determinations.

3. The yield figures represent the yield of bone-dry screened and unbleached pulp per hundred cubic feet of solid bone-dry wood. For the purposes of this article, it has been assumed that the ordinary cord of rossed wood piled 4′x4′x8′ is equivalent to 100 solid cubic feet of wood. To convert the yields on bone-dry basis to air-dry pulp containing 10 per cent moisture, divide the yield by 0.9.

The yield data are based on results oobtained from experimental runs made under very favorable conditions. The pulp logs on arrival at the Laboratory are barked, sawed into convenient size and any wood containing knots and decayed spots is rejected. The chips are carefully sorted and are far more uniform in size and moisture content than can be obtained

*This is the revision of an article of the same title by Dr. Otto Kress, Sidney D. Wells, and Vance P. Edwardes, published in "Paper," July 30, 1919, in which thirty new species have been added and many of those in the original article changed to conform with later experience.

in commercial practice unless the mills operate under more favorable conditions than ordinarily exist. Further, each cook representing an individual experiment, it is possible to press, shred, sample and screen the pulp with fewer mechanical losses than is feasible in handling the pulp in commercial practice from the blow pit to the wet machine or to the finished paper.

4. The comparison of the character and uses of the various pulps that may be obtained from the different woods offers certain difficulties. It has, therefore, been decided to consider white spruce as the standard wood for pulping by the sulphite, sulphate and mechanical processes and to compare the pulp that might be obtained from any given wood by this process of pulping with the pulp obtained from white spruce. Aspen wood has likewise been adopted as the standard for reduction by the soda process, and soda pulps from other woods will be compared with it. Sulphate pulps made from deciduous woods bleach with greater ease and economy than the corresponding soda pulps.

The bleachability of sulphate pulps have been given since recent work has demonstrated that with proper methods and equipment sulphate pulps from many coniferous woods can be bleached with average amounts of bleaching powder to a very satisfactory white.

Further, no data are given on the possible soda pulping of the various firs, pines, hemlocks, larch, tamarack and other woods that can be reduced by the sulphate process. The Laboratory has made extensive pulping trials on the reduction of these woods by the soda process and it is, of course, recognized that this process can be and is at present employed to a limited extent for reduction of certain of these woods. In general, the soda process can be used for reduction of any wood suitable for the production of sulphate pulp.

No figures have been given for bleach consumption. It has appeared advisable to compare the ease of bleaching for any given pulp with the standard white spruce sulphate and aspen soda pulp.

The data given must, or course, be interpreted with the understanding that the figures and results are based on experimental pulping trials. We believe that it may be of interest if used with this reservation for comparing the character and yields of pulps that may be expected from different woods.

BLACK SPRUCE—Picea mariana. Wt. 23 lbs. Fiber 2.6 m. m.

Range—Newfoundland to Hudson bay and northwestward to the Mackenzie river; southward in Michigan, Wisconsin, Minnesota, and in the eastern mountains to North Carolina and Tennessee.

Common Names—Black spruce (N. H., Vt., Mass., R. I., N. Y., Pa., W. Va., N. Ca., S. Ca., Wis., Mich., Minn., Ont., Eng); double spruce (Me., Vt., Minn.); blue spruce (Wis.); spruce (Vt.); white spruce (W. Va.); yew pine (W. Va.); juniper (N. Ca.); spruce pine (W. Va., Pa.); he balsam (Del., N. Ca.); epinette jaune (Quebec); water spruce (Canada, Me.)

Sulphite Pulp—
Yield 1,050 lbs.
Character—
Easily pulped.
Easily bleached.
Excellent strength and color.
Possible uses—Same as white spruce.

Sulphate Pulp—
Yield 1,150 lbs.
Character and uses—Similar to white spruce.

Mechanical Pulp—
Similar to white spruce.

BLUE SPRUCE—Picea parryana. Wt. 23 lbs. Fiber 2.8 m. m.

Range—Central Rocky Mountain region—Colorado, Utah and Wyoming.

Common Names—Parry's spruce (Utah); blue spruce (Colo); spruce balsam (Colo., Utah); white spruce (Colo., Utah); silver spruce (Colo.); Colorado blue spruce (Colo.); prickly spruce (lit.).

Sulphite Pulp—
Yield 1,050 lbs.
Character—
Easily pulped.
Easily bleached.
Excellent strength and color.
Possible uses—Same as white spruce.

Sulphate Pulp—
Yield 1,150 lbs.
Character and uses—Same as white spruce.

Mechanical Pulp—
Similar to white spruce.

ENGELMANN SPRUCE—Picea engelmanni. Wt. 21 lbs. Fiber 3 m.m.

Range—Northern Arizona and through the Rocky Mountain region to British Columbia.

Common Names—Engelmann's spruce (Utah); balsam (Utah); white spruce (Oreg., Colo., Utah, Idaho); white pine Idaho); mountain spruce (Mont.); Arizona spruce (Cal. lit.).

Sulphite Pulp—
Yield 990 lbs.
Character—
A little hard to pulp.
Excellent strength.
Excellent color.
Possible uses—Same as white spruce.

Sulphate Pulp—
Yield 1,000 lbs.
Character and possible uses—Similar to white spruce.

Mechanical Pulp—
Yield 2,100 lbs.
Character—
Strong fiber of good color.
Possible uses—Same as white spruce.

NORWAY SPRUCE—Picea excelsa. *Wt. 30 lbs. Fiber———
*Range—From the Urals and Lapland to the Pyrenees and Alps.

*Common Names—Spruce fir, common spruce, white fir.

Sulphite Pulp—
Yield 1,350 lbs.
Character—
Slightly more difficult to reduce than white spruce.
Good strength and color.
Possible uses—Same as white spruce.

Sulphate Pulp—
Yield 1,200 lbs.
Character—
Easily pulped.
Good strength.
Possible uses—Same as white spruce.

Mechanical Pulp—
Probably the same as the other spruces.

RED SPRUCE—Picea rubens. Wt. 24 lbs. Fiber 3.7 m.m.

Range—Nova Scotia to North Carolina and Tennessee. Range imperfectly known.

Common Names—Red spruce; yellow spruce (N. Y.); North American red spruce (foreign lit.).

Sulphite Pulp—
Yield 1,080 lbs.
Character—
Easily pulped.
Good strength.
Easily bleached.
Excellent color.
Possible uses—Same as white spruce.

Sulphate Pulp—
Yield 1,150 lbs.
Character—
High-grade.
Strong fiber.
Possible uses—Same as white spruce.

Mechanical Pulp—
Yield 2,400 lbs.
Character—
Excellent strength and color.
Possible uses—Similar to white spruce.

SITKA SPRUCE—Picea sitchensis. Wt. 24 lbs. Fiber 3.5 m.m.

Range—Coast region (extending inland about fifty miles) from Alaska to northern California (Mendocino County).

Common Names—Tideland spruce (Cal., Ore., Wash.); Menzies' spruce; western spruce; great tideland spruce (Cal. lit.).

Sulphite Pulp—
Yield 1,080 lbs.
Character—
Easily pulped.
Easily bleached.
Excellent strength and color.
Possible uses—Same as white spruce.

Sulphate Pulp—
Yield 1,150 lbs.
Character and uses—Similar to white spruce.

Mechanical Pulp—
Yield 2,040 lbs.
Character—
Slightly grayish color.
Possible uses—Similar to white spruce.

*From English data.

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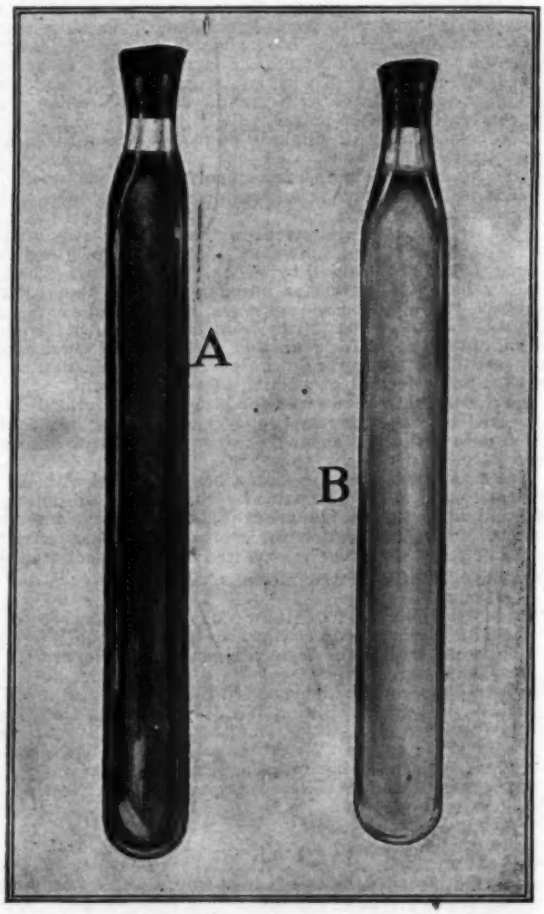


A. *The vial on the left contains refined linseed oil such as is used in the vehicle of the highest quality oil paints. It is deep amber color. (Note the darkness of the photograph.)*

B. *On the right is the same oil after being treated by the "Rice Process." It is almost colorless. This is one of the secrets of the lasting whiteness of Barreled Sunlight. (Reproduced from an actual photograph.) We shall be glad to exhibit the two vials upon request.*

Barreled Sunlight

THE RICE PROCESS WHITE

WHITE SPRUCE—Picea canadensis. Wt. 24 lbs. Fiber 2.8 m.m.
Range—Newfoundland to Hudson Bay and northwestward to Alaska; southward to northern New York, Michigan, Wisconsin, Minnesota, South Dakota, Montana and British Columbia.
Common Names—White spruce (Vt., N. H., Mass., N. Y., Wis., Mich., Minn., Ont.); single spruce (Me., Vt., Minn.); bog spruce (New Eng.); skunk spruce (Wis., Me., New Eng., Ont.); cat spruce (Me., New Eng.); spruce (Vt.); pine (Hudson bay); double spruce (Vt.).
Sulphite Pulp—
Yield 1,030 lbs.
Character—
Easily pulped.
Easily bleached.
Excellent strength and color.
Possible uses—White spruce is considered the standard sulphite pulpwood and is used for news, wrapping, book, high-grade printings, etc.
Sulphate Pulp—
Yield 1,150 lbs.
Character—
Very strong fine fiber.
Possible uses—Highest grade of kraft paper and strong fiber board.
Mechanical Pulp—
Yield 2,400 lbs.
Character—
Excellent strength and color.
Possible uses—For practically every purpose where groundwood pulp is required.

LIMBER PINE—Pinus flexilis. Wt. 23 lbs. Fiber———.
Range—Rocky Mountain region from Montana to western Texas (Guadalupe and Limpia mountains) and New Mexico; in mountains of northern Arizona, Utah, Nevada and California (Inyo Mountains and Mount Sillman).
Common Names—White pine (Cal., Nev., Utah, Colo., N. Mex.); pine (Utah, Mont.); bull pine (Colo.); Rocky Mountain white pine (Cal.); Rocky Mountain pine; limber-twig pine (Cal. lit.); western white pine (Cal. lit.); Arizona flexilis pine.
Sulphite Pulp—
Yield 1,000 lbs.
Character—
Difficult to pulp and bleach.
Fair strength but shivey and poor color.
Possible uses—Few.
Sulphate Pulp—
Yield 1,040 lbs.
Character—
Good strength and color.
Fairly easily bleached.
Possible uses—Similar to white spruce.
Mechanical Pulp—
Probably the same as white pine.

PINON PINE—Pinus edulis. Wt. 31 lbs. Fiber 2.0 m. m.
Range—From Colorado (eastern base Pikes Peak) through New Mexico and to western Texas (mountains.)
Common Names—Pinon (Tex., Colo.); nut pine (Tex., Colo.); pinon pine (Colo.); New Mexican pinon (lit.).
Sulphite Pulp—
Yield 1,330 lbs.
Character—
Easily pulped.
Difficult to bleach.
Fair strength, somewhat shivey, and fair color.
Possible uses—Wrappings.
Sulphate Pulp—
Yield 1,300 lbs.
Character and uses—similar to white spruce.
Mechanical Pulp—
Probably the same as white pine.

SUGAR PINE—Pinus lambertiana. Wt. 23 lbs. Fiber 4.1 m.m.
Range—Coast region from Oregon (head of McKenzie and Rogue rivers) to California (Sierra Nevada mountains and coast ranges to Santa Lucia mountains; San Bernardino and Cuyamaca mountains).
Common Names—Sugar pine (Cal., Oreg.); big pine; shade pine (Cal); great sugar pine; little sugar pine; gigantic pine (Cal. lit.); purple-coned sugar pine.
Sulphite Pulp—
Yield 1,010 lbs.
Character—
Easily pulped.
A little difficult to bleach.
Poor strength.
Fair color.
Possible uses—Dark colored wrappings.
Sulphate Pulp—
Yield 1,150 lbs.
Character—
Fairly easily bleached.
Possible uses—Similar to white spruce.
Mechanical Pulp—
Probably the same as white pine.

WHITE PINE—Pinus strobus. Wt. 22 lbs. Fiber 3.8 m.m.
Range—From Newfoundland (White Bay region) and along the northern shores of St. Lawrence gulf to northern Ontario (near Abitibi and Nipigón lakes) southern Manitoba (near southern end of Lake Winnipeg); southward through northern and eastern Minnesota, northeastern (Mitchell county) and eastern border of Iowa (to Scott county), northern (counties) Illinois, southern shores of Lake Michigan, southern Michigan (north of Allegan, Eaton and St. Clair counties); northeastern and eastern (border counties) Ohio and along the Allegheny mountains to northern Georgia (Tallulah Falls).
Common Names—White pine (Me., N. H., Vt., Mass., R. I., Conn., N. Y., N. J., Pa., Del., Va., W. Va., N. C., Ga., Ind., Ill., Wis., Mich., Minn., Ohio, Ont., Nebr.); Weymouth pine (Mass., S. C.); soft pine (Pa.); northern pine (S. C.); spruce pine (Tenn.).
Sulphite Pulp—
Yield 1,210 lbs.
Character—
Difficult to pulp.
Difficult to bleach.
Fair strength, but shivey and poor color.
Possible uses—Few.
Sulphate Pulp—
Yield 1,100 lbs.
Character—
Excellent strength and color.
Fairly easily bleached.
Possible uses—Similar to white spruce.
Mechanical Pulp—
Yield 1,890 lbs.
Character—
Good strength and color, but pitchy.
Possible uses—Similar to white spruce.

JACK PINE—Pinus divaricata. Wt. 24 lbs. Fiber 2.5 m.m.
Range—New Brunswick to New Hampshire and west through Great Lake and Hudson bay (southern shores) region to Great Bear Lake. Mackenzie river, and Rocky mountains; south into northern Maine, northern New York, northern Indiana and Illinois, and central Minnesota.
Common Names—Scrub pine (Me., Vt., N. Y., Wis., Mich., Minn., Ont.); gray pine (Vt., Minn., Ont.); Jack pine (Mich., Minn., Canada); princess pine (Ont.); black jack pine (Wis.); black pine (Minn.); cypress (Quebec to Hudson bay); Canada horn-cone pine (Cal., lit.); chek pine; Sir Joseph Bank's pine (Eng.); "Juniper" (Canada); banksian pine (lit.).
Sulphite Pulp—
Yield 1,080 lbs.
Character—
Not easily pulped.
Very difficult to bleach.
Fair strength.
Poor color.
Pulp shivey and full of pitch.
Possible uses—Mechanical difficulties when running this pulp over the paper machine prevent its use.
Yield 1,150 lbs.
Sulphate Pulp—
Character—
Very strong tough fiber.
Fairly easily bleached.
Possible uses—Similar to white spruce.
Mechanical Pulp—
Yield 2,130 lbs.
Character—
Gray, somewhat soft.
Good strength.
Pitchy.
Poor Finish.
Possible uses—Medium grades of groundwood.

LOBLOLLY PINE—Pinus taeda. Wt. 30 lbs. Fiber 3.0 m.m.
Range—South Atlantic and gulf states from New Jersey (Cape May), southern Delaware and West Virginia (Wood, Mineral, Hampshire and Hardy counties) to central Florida (Cape Malabar and Tampa bay) and west to eastern

How the New Superintendent Cut Costs *in the* Pulp Mill

"WHEN we put the new superintendent in charge of the pulp mill we expected him to make some changes and he certainly lived up to expectations. He hadn't been on the job two days when he came into the office and said, 'I'd like to make a suggestion regarding your screens.' We told him that we would be glad to receive any suggestions he might want to give.

"'I know a method of doubling and, on some grades of stock, tripling the quantity of production, besides saving labor and power and making cleaner stock,' he said. 'It would mean the installation of a new piece of equipment but it would be many times worth the cost. I have seen it in operation in a number of mills.

"'It is the P.A.P.A. Rotary Pulp Screen and to my knowledge one screen does the work of two or three, ten to twelve plate flat screens, depending on the stock, besides occupying less space and being much easier to operate and care for.'

"We told him to go ahead and the machine certainly lived up to expectations."

Full particulars regarding the P.A.P.A. Pulp Screen may be obtained by writing the—

VALLEY IRON WORKS COMPANY

Plant: Appleton, Wis. **New York Office: 350 Madison Avenue**

Builders of Niagara Beaters, High Speed Holland Beaters and Washers, Wolf Chippers, Barkers, Chip Screens, Aetna Sulphur Burners, Valley Refiners, Valley Wet Machines, Hansen Roll Skinners, etc.

Texas (Colorado river; in Bastrop county); northward into southeastern Indian territory, Oklahoma, Arkansas and southern border of middle and west Tennessee.

Common Names—Loblolly pine (Del., Va., N. C., S. C., Ga., Ala., Fla., Miss., La., Tex., Ark.); Oldfield pine (Del., Va., N. C., S. C., Ga., Ala., Fla., Miss., La., Tex., Ark.); torch pine (Eng. lit.); Rosemary pine (Va., N. C., in part); slash pine (Va., N. C., in part); Longschat pine (Del.); Longshucks (Md., Va.); Black slash pine (S. C.); Frankincense pine (lit.); Shortleaf pine (Va., N. C., S. C., La.); bull pine (Texas and gulf region); Virginia pine; sap pine (Va. N. C.) meadow pine (Fla.); cornstalk pine (Va.); Black pine (Va.); Foxtail pine (Va., Md.); Indian pine (Va., N. C.); spruce pine (Va., in part); bastard pine (Va., N. C.); yellow pine (north Ala., N. C.); swamp pine (Va., N. C.); Longstraw pine (Va., N. C., in part).

Sulphite Pulp—
Yield 1,140 lbs.
Character—
Easily pulped.
Difficult to bleach.
Good strength and color.
Possible uses—As a substitute for white spruce.

Sulphate Pulp—
Yield 1,420 lbs.
Character—
Fairly easily bleached.
Strong but coarse fiber.
Possible uses—Similar to white spruce.

Mechanical Pulp—
Yield 2,450 lbs.
Character—
Short fiber and very pitchy.
Possible uses—Only when mixed with better grades of groundwood fibers.

LODGEPOLE PINE—Pinus murrayana. Wt. 24 lbs. Fiber 2.3 m.m.

Range—From Alaska (Yukon river) and southward through interior British Columbia; the mountains of Washington and Oregon to California (Sierra Nevada mountains to San Jacinto mountains); plateau east of the Rocky mountains (latitude 56) and south through the Rocky mountain region to New Mexico and northern Arizona. Also coast region from Alaska to California (Mendocino county).

Common Names—Tamarack (Wyo., Utah, Mont., Cal.); prickly pine (Utah); white pine (Mont.); black pine (Wyo.); lodgepole pine (Wyo., Mont., Idaho); spruce pine (Colo., Idaho, Mont.); Tamarack pine (Cal.); Murray pine (Cal. lit.); scrub pine, knotty pine, sand pine, (Oreg.); Bolander's pine, Henderson's pine, north coast scrub pine (Cal. lit.).

Sulphite Pulp—
Yield 1,080 lbs.
Character—
Easily pulped.
A little hard to bleach.
Excellent strength and color.
Possible uses—As a substitute for white spruce.

Sulphate Pulp—
Yield 1,120 lbs.
Character and uses—Same as white spruce.

Mechanical Pulp—
Yield 2,140 lbs.
Character and uses—A little pitchy but otherwise similar to white spruce.

NOTE—The lodgepole pine which grows in the lowlands in the coastal region is very similar to jack pine. The Rocky Mountain region lodgepole pine, however, contains much less pitch, and is to be preferred for sulphite and mechanical pulps.

LONGLEAF PINE—Pinus palustris. Wt. 34 lbs. Fiber 3.7 m.m.

Range—Coast region, from southern Virginia (Norfolk) to Florida (Tampa Bay and Cape Canaveral) to eastern Texas (Trinity river); northward in Alabama to the northeastern part of the state (Clay and Walker counties) and northwestern (border counties) Georgia.

Common Names—Longleaved pine (Va., N. C., S. C., Ga., Ala., Fla., Miss., La., Tex.); southern pine (N. C., Ala., Miss., La.); yellow pine (Del., N. C., S. C., Ala., Fla., La., Tex.); turpentine pine (N. C.); rosemary pine (N. C.); brown pine (Tenn.); hard pine (Ala., Miss., La.); Georgia pine (general, Del.); fat pine (southern states); southern yellow pine (general); southern hard pine (general); southern heart pine (general); southern pitch pine (general); heart pine (N. C. and south Atlantic region); pitch pine (Atlantic region); longleaved yellow pine (Atlantic region); longleaved pitch pine (Atlantic region); longstraw pine (Atlantic region; North Carolina pitch pine (Vt., N. C.); Georgia yellow pine (Atlantic region); Georgia heart pine (general); Georgia longleaved pine (Atlantic region); Georgia pitch pine (Atlantic region); Florida yellow pine (Atlantic region); Florida pine (Atlantic region); Florida longleaved pine (Atlantic region); Texas yellow pine (Atlantic region); Texas longleaved pine (Atlantic region).

Sulphite Pulp—
Yield 1,840 lbs. (Crude pulp).
Character—
Cannot be bleached.
Very poor color.
In general, this wood cannot be considered satisfactory for sulphite pulp.
Possible uses—Few.

Sulphate Pulp—
Yield 1,600 lbs.
Character—
Strong, but coarse fiber.
Possible uses—Similar to white spruce.

MONTEREY PINE—Pinus radiata. Wt. 29 lbs. Fiber———.

Range—California (Point Pinos on Monterey Bay, and along the coast from Pescadero to San Cimeon Bay).

Common Names—Monterey pine (Cal.); spreading-cone pine (Cal. lit.); nearly smooth-cone pine (Cal. lit.); remarkable pine (Cal. lit.); small-coned Monterey pine (Cal. lit.); two-leaved insular pine.†

Sulphite Pulp—
Yield 1,260 lbs.
Character—
Easily pulped.
Difficulty to bleach.
Good color.
Fair strength.
Possible uses—As a substitute for white spruce.

Sulphate Pulp—
Yield 1,450 lbs.
Character—
Easily pulped.
Difficult to bleach.
Good strength.
Possible uses—Similar to white spruce.

NORWAY PINE—Pinus resinosa. Wt. 27 lbs. Fiber 3.7 m.m.

Range—From Newfoundland and along the northern shores of St. Lawrence Gulf to northern Ontario (north of Abitibi Lake) to southern Manitoba (near southern end of Lake Winnipeg); southward through the northern states to Massachusetts (Middlesex county). Pennsylvania (Chester county), northeastern Ohio (north of Cleveland) central Michigan (Saginaw), northern Wisconsin (Oskosh and Eau Claire), and northeastern Minnesota.

Common Names—Red pine (Vt., N. H., N. Y., Wis., Minn., Ont.); Norway pine (Me., N. H., Vt., Mass., N. Y., Wis., Minn., Ont.); hard pine (Wis.); Canadian red pine (Eng.).

Sulphite Pulp—
Yield 1,230 lbs.
Character—
Difficult to pulp and bleach.
Poor strength.
Possible uses—Few.

Sulphate Pulp—
Yield 1,350 lbs.
Character—
Fairly easily bleached.
Possible uses—Similar to white spruce.

Mechanical Pulp—
Because of high pitch content is probaly unsuitable for this purpose.

PITCH PINE—Pinus rigida. Wt. 29 lbs. Fiber———.

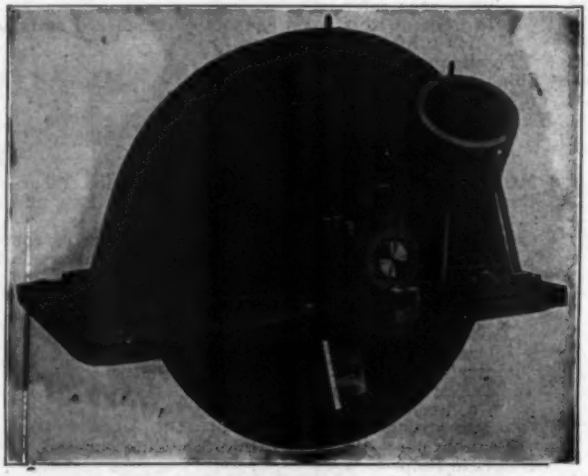
Range—From southern New Brunswick (St. Johns river) to eastern Ontario (north shore of Lake Ontario and lower Ottawa river) and southward in the Atlantic region to southern Virginia (Norfolk) and along the mountains to northern Georgia (Atlanta); west to western New York (Ithaca), northeastern Pennsylvania, eastern Ohio (border counties south of Canton) and Kentucky, eastern Tennessee (to Cumberland mountains).

Common Names—Pitch pine (Vt., N. H., Mass., R. I., Conn., N. Y., N. J., Pa., Del., W. Va., N. C., S. C., Ga, Ohio, Ont., Md., Eng.); longleaved pine (Del.); longschat pine (Del.); black Norway pine (N. Y.); hard pine (Mass.); yellow pine (Pa.); black pine (N. C.); rigid pine (Eng. lit.); sap pine (lit.).

Sulphite Pulp—
Yield 1,250 lbs.
Character—

†Refers to the two-leafed form Pinus radiata binnata (Engelm.) Lemm., found on Santa Rosa, Santa Cruz, and Guadaloupe islands.

Pulp and Paper Mill Machinery



Chippers

That produce clean, evenly cut chips, free from slivers.

Our patented improvements make this possible.

Made in
48″, 84″, 90″ Sizes

Right or Left Hand
Three or Four Knives

Description on Request

We manufacture

Wet Machines

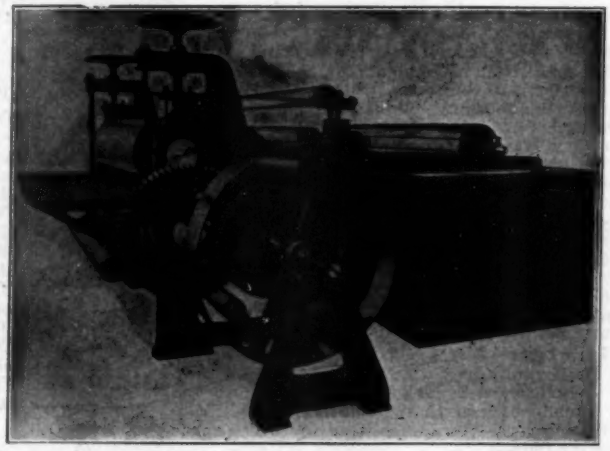
that give satisfaction

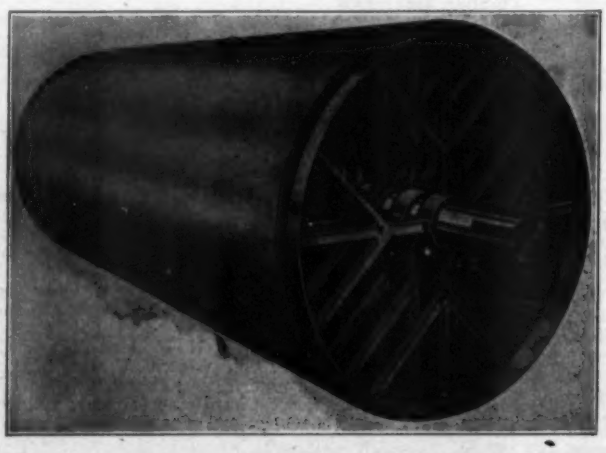
Single Cylinder
Double Cylinder

Any width face or diameter mould.

We also make a combination wet machine and decker.

Particulars on Request





Cylinder Moulds

Made on our special machinery—will stand long wear.

Hand sewed covers—Removable end Clamping Rings

Give a smooth surface, therefore a longer life to your felt.

Satisfaction Guaranteed

We also manufacture the "WOLF (Patented) MOULD."

We also manufacture 3 and 4 pocket Grinders, Screens, Barkers, Pumps, Iron, Brass, Bronze and Lead Castings

UNION IRON WORKS Bangor, Maine

Difficult to pulp and bleach.
Poor strength—pitchy.
Possible uses—Few.

Sulphate Pulp—
Yield 1,430 lbs.
Character—
Fairly easily bleached.
Possible uses—Similar to white spruce.

Mechanical Pulp—
Because of high pitch content is probably unsuitable for this purpose.

POND PINE—Pinus serotina. Wt. 31 lbs. Fiber———.
Range—Coast region from North Carolina to Florida (head of St. Johns river and probably farther south; on the west coast from Pensacola to Citrus county and probably much farther south). Range imperfectly known.
Common Names—Marsh pine (N. C.); Meadow pine (N. C.); bond pine (N. C., S. C., Fla., Miss., La.); loblolly pine (N. C., Fla.); spruce pine (S. C., Ga.); bastard pine (S. C., Ga.); bull pine (S. C., Ga.).

Sulphite Pulp—
Yield 1,360 lbs.
Character—
Fairly easily pulped and bleached.
Fair color.
Possible uses—As a substitute for spruce.

Sulphate Pulp—
Yield 1,400 lbs.
Character—
Fairly easily bleached.
Strong but coarse fiber.
Similar to white spruce.

Mechanical Pulp—
Probably the same as loblolly pine.

SAND PINE—Pinus clausa. Wt. 29 lbs. Fiber———.
Range—Coast of Alabama (Baldwin county) and western Florida (to Pease creek); east coast of Florida from St. Augustine to Halifax river.
Common Names—Sand pine (Fla., Ala.); Oldfield pine (Fla.); Florida spruce pine (Ala.); scrub pine (Fla.); spruce pine (Fla.); upland spruce pine (Fla.).

Sulphite Pulp—
Yield 1,300 lbs.
Character—
Easily pulped.
Difficult to bleach and shivey.
Fair strength.
Good color.
Possible uses—As a substitute for white spruce.

Sulphate Pulp—
Yield 1,220 lbs.
Character—
Fairly easily bleached.
Possible uses—Similar to white spruce.

Mechanical Pulp—
Because of high pitch content is probably unsuitable for this purpose.

SCOTCH PINE—Pinus sylvestris.‡ Wt. 37 lbs. Fiber———.
Range‡—Europe and northern Asia up to 70 ft. above sea level in the far north; 6,500 ft. in southern Europe.
Common Names‡—Scots (Scotland), Scotch fir (England), northern pine (general).

Sulphite Pulp—
Yield 1,600 lbs.
Character—
Difficult to pulp and bleach.
Poor strength and pitchy.
Possible uses—Few.

Sulphate Pulp—
Yield 1,600 lbs.
Character—
Fairly easily bleached.
Strong, tough fiber.
Possible uses—Similar to white spruce.

Mechanical Pulp—
Because of pitch content is probably unsuitable for this purpose.

SCRUB PINE—Pinus Virginiana. Wt. 26 lbs. Fiber 2.8 m.m.
Range—From New York (Staten Island) to South Carolina (Aiken river) and northern Alabama (Winston, Cullman, and Dekalb counties); west into southern Indiana, to middle Tennessee (Putnam county).
Common Names—Jersey pine (N. J., Pa., Del., N. C., S. C.); scrub pine (R. I., N. Y., Pa., Del., N. C., S. C., Ohio); short shucks (Md., Va.); shortshat pine (Del.); spruce pine (N. J.,

‡From English data.

Ultimate Economy

IN

POWER TRANSMISSION MACHINERY is not determined by the purchase price alone; but is arrived at, by dividing the purchase price by the number of years of continuous and uninterrupted service the Transmission Machinery gives you.

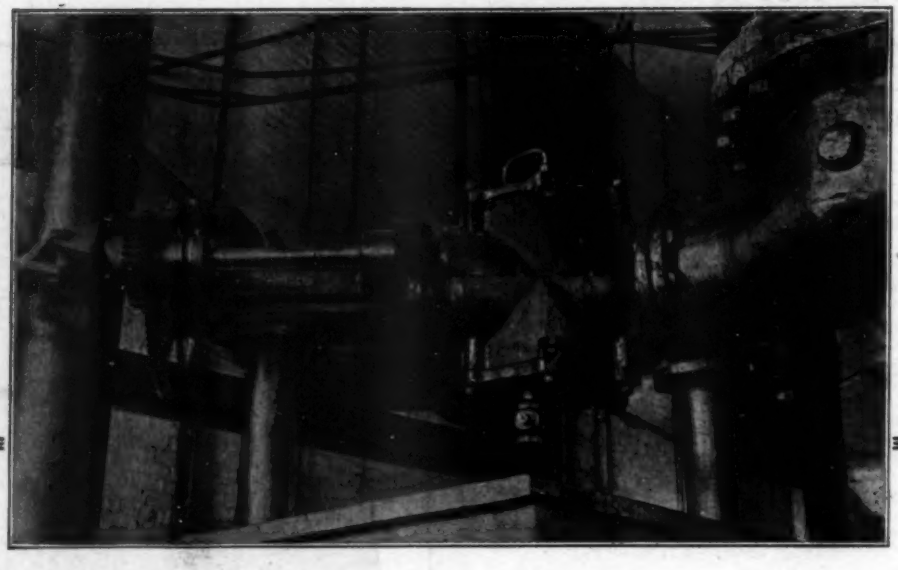
Our appliances are so designed and constructed that the length of service they render is measured only by the life of the plant in which they are installed. Even then they ofttimes may be transferred to other fields of usefulness, so that their final cost is so small as to be almost nil.

May we send you our catalog?

It contains some interesting and useful data on POWER TRANSMISSION APPLIANCES and the problems which beset the user.

T. B. WOOD'S SONS CO.
CHAMBERSBURG, PA.

POWER TRANSMITTING MACHINERY



The HORKMAN

Improved Safety Blow-Off Valve (pat.)

The illustration above shows an actual and a very satisfactory installation of a Horkman Safety Blow-Off Valve. This is in the Wisconsin Rapids Plant of the Consolidated Water Power and Paper Company.

Let us mail you more detailed specifications.

Henry Horkman NEENAH WISCONSIN

N. C.); shortleaved (N. C.); cedar pine (N. C.); river pine (N. C.); nigger pine (Tenn.); New Jersey pine (lit.).
Sulphite Pulp—
Yield 1,000 lbs.
Character—
Easily pulped.
Difficult to bleach.
Good color.
Possible uses—As a substitute for spruce.
Sulphate Pulp—
Yield 1,250 lbs.
Character—
Fairly easily bleached.
Strong, but coarse fiber.
Possible uses—Similar to white spruce.
Mechanical Pulp—
Similar to loblolly pine.

SHORTLEAF PINE—Pinus echinata. Wt. 31 lbs. Fiber 3.7 m.m.
Range—From New York (Staten Island) to Florida (Chattahoochee region) and west to southern Missouri, eastern Oklahoma, and northeastern Texas.
Common Names—Yellow pine (N. Y., N. J., Pa., Del., Va., N. C., Ala., Miss., La., Ark., Mo., Ill., Ind., Kans., (scarce), Ohio, (Eng. lit.); shortleaved pine (N. C., S. C., Ga., Ala., Miss., Fla., La., Tex., Ark.); spruce pine (Del., Miss., Ark.); bull pine (Va.); shortshat pine (Del.); pitch pine (Mo.); poor pine (Fla.); shortleaved yellow pine; rosemary pine (N. C.); Virginia yellow pine (Va. in part); North Carolina pine (N. C. and Va. in part); Carolina pine (N. C. and Va. in part); slash pine (N. C., Va., in part); Oldfield pine (Ala., Miss.).
Sulphite Pulp—
Yield 1,500 lbs.
Character—
Difficult to pulp and bleach.
Pitchy.
Possible uses—Few.
Sulphate Pulp—
Yield 1,450 lbs.
Character—
Fairly easily bleached.
Strong, but coarse fiber.
Possible uses—Similar to white spruce.
Mechanical Pulp—
Because of pitch content is probably unsuitable for this purpose.

SLASH PINE—Pinus heterophylla. Wt. 37 lbs. Fiber———.
Range—Coast region (60 to 100 miles inland), from South Carolina (Charleston) to southern Florida (Cape Canaveral and Biscayne Bay) and west to Louisiana (Pearl river).
Common Names—Slash pine (Ala., Miss., Ga., Fla.); swamp pine (Fla., Miss., Ala., in part); bastard pine (Ala., lumbermen, Fla.); meadow pine (Fla., eastern Miss., in part); pitch pine (Fla.); she pitch pine (Ga.); she pine (Ga., Fla.); spruce pine (southern Ala.).
Sulphite Pulp—
Because of high pitch content is probably unsuitable for this purpose.
Sulphate Pulp—
Yield 1,650 lbs.
Character—
Fairly easily bleached.
Strong, but coarse fiber.
Possible uses—Similar to white spruce.
Mechanical Pulp—
Because of high pitch content is probably unsuitable for this purpose.

WESTERN YELLOW PINE—Pinus ponderosa. Wt. 24 lbs. Fiber 3.6 m. m.
Range—From British Columbia (interior south of latitude 51°), and Dakota (Black Hills region), southward in the Pacific and Rocky mountain region to western Texas and Mexico.
Common Names—Yellow pine (Cal., Colo., Mont., Idaho, Utah, Wash., Oreg.); bull pine (Cal., Wash., Utah, Idaho, Oreg.); big pine (Mont.); longleaved pine (Utah, Nev.); red pine, pitch pine, southern yellow pine, heavy-wooded pine (Eng.); western pitch pine, heavy pine (Cal.); foothills yellow pine, Sierra brownbark pine, Montana black pine (Cal. lit.); "Gambier Parry's pine" (Eng. lit.).
Sulphite Pulp—
Yield 1,130 lbs.
Character—
Not difficult to pulp.
Difficult to bleach, shivy.

De Laval Centrifugal Fire Pumps

A DE LAVAL turbine-driven centrifugal fire pump insures instant, adequate protection, as the pump is always ready for service. It is simple in construction, containing no water valves and no steam valves, except the governor valve. The only metal parts in rubbing contact are the bearings, and the only packings are the simple ones about the shaft. The impellers, shaft sleeves, bushings, packing glands and oil rings are made of bronze. The turbine can be started immediately when needed without preliminary warming up. The photograph shows two De Laval Underwriter multi-stage fire pumps driven by De Laval velocity-stage turbines and having a capacity of 1500 gals. per min. each against 350 ft. total head when running at 1740 r.p.m.

All De Laval machines are built to limit gages on an interchangeable basis throughout, and are thoroughly tested before leaving the works.

Ask for Catalog C 82

De Laval
Steam Turbine Co.
Trenton, N. J.

Local Offices:—Atlanta, Birmingham, Boston, Charlotte, Chicago, Cleveland, Dallas, Denver, Duluth, Indianapolis, Kansas City, Los Angeles, Montreal, New York, New Orleans, Philadelphia, Pittsburgh, Salt Lake City, San Francisco, Seattle, Toronto.

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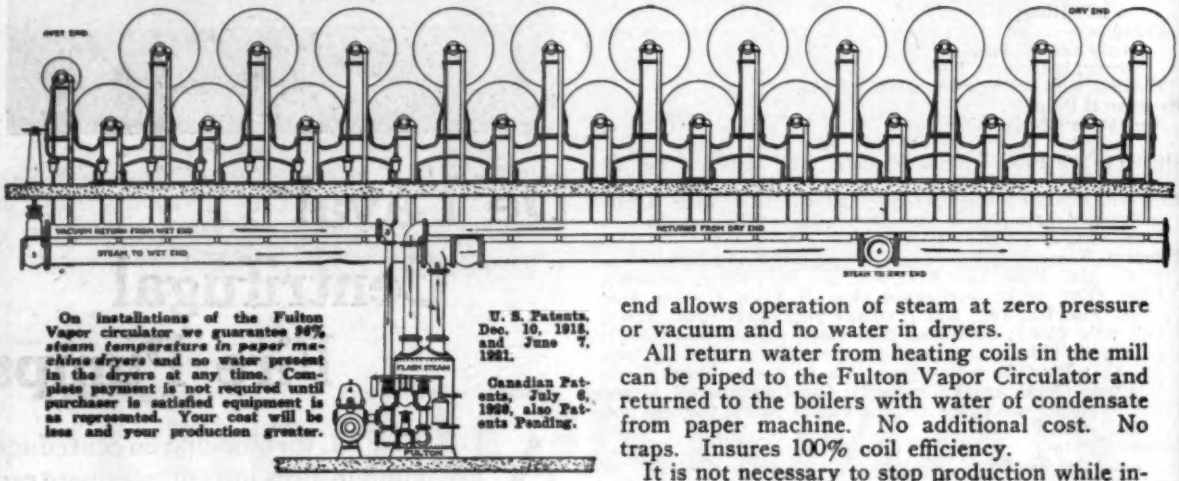
The FULTON FORCED VAPOR CIRCULATOR

KEEPS ALL WATER OUT OF DRYERS

Reduces Fuel Consumption—Increases Production



On installations of the Fulton Vapor circulator we guarantee 90% *steam temperature in paper machine dryers* and no water present in the dryers at any time. Complete payment is not required until purchaser is satisfied equipment is as represented. Your cost will be less and your production greater.

U. S. Patents, Dec. 10, 1918, and June 7, 1921.

Canadian Patents, July 6, 1920, also Patents Pending.

THE FULTON FORCED VAPOR CIRCULATOR

The operation and the principle of this system is not in the least complicated. It is, on the other hand, extremely simple as will be readily noted by means of the accompanying drawing. An explanation to this drawing is given briefly in the following:

1.—Return from dry end and steam supply to wet end.

2.—Steam to wet end.

3.—Vacuum return from wet end to pump.

4.—Vacuum pump. Steam or electric pump may be used.

5.—Valve through which air is blown when starting the machine after a period of shut down. **Maximum dryer temperature is thus obtained in fifteen minutes.**

6.—Steam supply to dryers.

Steam pumps 100% efficient by exhausting into the wet end dryers, therefore the cost of removing air and water from the dryers is practically nothing.

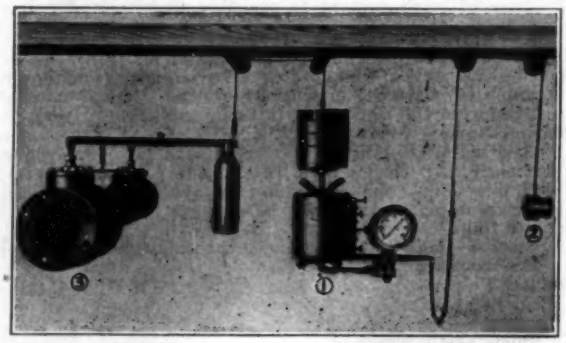
With this system practically 75% of the dryers constitute the dry end of the paper machine. By drying paper with less steam or vacuum on wet end gives a wider, stronger and better finished sheet and prevents cockling. Vacuum on wet end allows operation of steam at zero pressure or vacuum and no water in dryers.

All return water from heating coils in the mill can be piped to the Fulton Vapor Circulator and returned to the boilers with water of condensate from paper machine. No additional cost. No traps. Insures 100% coil efficiency.

It is not necessary to stop production while installing the Fulton Circulator since there are only three connections necessary, 1, 2 and 3.

DEMON STEAM PRESSURE REGULATOR

It is impossible to waste steam where the Demon Regulator is on the job. It stands as an ever alert watch over your coal pile. It also insures perfect steam regulation, for the live steam in inlet and exhaust valves is controlled by the pilot cylinder—1.



U. S. PAT. MAY 2, 1922

The remote control is placed on front side of paper machine—2. One operation of this controls incoming steam and exhaust.

Where this regulator is used, master valves are placed in the steam lines—3.

The Demon Steam Pressure Regulator is built in all sizes and for all pressures.

Why not ask us what we can do for your machine—it costs nothing

The FULTON ENGINEERING COMPANY

MIDDLETOWN, OHIO

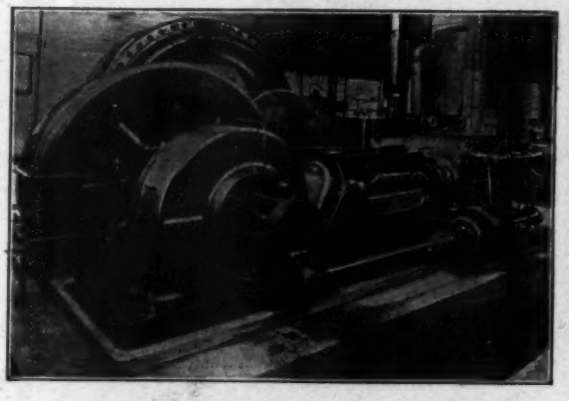
Very poor strength and color.
Possible uses—Few.
Sulphate Pulp—
Yield 1,100 lbs.
Character—
Fairly easily bleached.
Fine, high-grade, very strong, and tough fiber.
Possible uses—Same as white spruce.
Mechanical Pulp—
Yield 2,060 lbs.
Character—
Fibers are long, coarse and soft, creamy color and somewhat pitchy.
Possible uses—Where a medium quality of groundwood will answer the purpose.

ALPINE FIR—Abies lasiocarpa. Wt. 21 lbs. Fiber———.
Range—Rocky mountain region from Colorado to Montana and Idaho, and westward through northern Oregon and northward to Alaska (latitude 60 degrees).
Common Names—Sub-alpine fir (Utah); balsam (Colo., Utah, Idaho, Oreg.); white fir (Idaho, Mont.); white balsam, Oregon balsam-tree (Cal.); pumpkin-tree, alpine fir, mountain balsam (mountains of Utah and Idaho); down-cone fir (lit.); downy-cone sub-alpine fir (Cal. lit.).
Sulphite Pulp—
Yield 1,010 lbs.
Character—
Easily pulped.
Easily bleached.
Good strength.
Excellent color.
Possible uses—as a substitute for white spruce.
Sulphate Pulp—
Yield 1,050 lbs.
Character—
Excellent strength.
Long fiber.
Possible uses—Same as white spruce.
Mechanical Pulp—
Yield 2,070 lbs.
Character—
Fair strength.
White fiber.
Possible uses—Same as white spruce.

BALSAM FIR—Abies balsamea. Wt. 21 lbs. Fiber 2.7 m.m.
Range—From Newfoundland and Labrador to Hudson Bay and northwestward to Great Bear Lake region and south to Pennsylvania (and along high mountains to Virginia), Michigan and Minnesota.
Common Names—Balsam fir (N. H., Vt., Mass., R. I., N. Y., Pa., W. Va., Wis., Mich., Minn., Neb., Ohio, Ont., Eng. cult.); balsam (Vt., N. H., N. Y.); Canada balsam (N. C.); Balm of Gilead (Del.); Balm of Gilead fir (N. Y., Pa.); blister pine (W. Va.); fir pine (W. Va.); firtree (Vt.); single spruce (N. Bruns. to Hudson Bay); silver pine (Hudson Bay); sapin (Quebec); Cho-koh-tung "blisters" (N. Y. Indians).
Sulphite Pulp—
Yield 970 lbs.
Character—
Easily pulped.
Easily bleached.
Good strength.
Excellent color.
Possible uses—As a substitute for white spruce.
Sulphate Pulp—
Yield 1,010 lbs.
Character—
High grade kraft fiber.
Possible uses—Same as white spruce.
Mechanical Pulp—
Yield 1,910 lbs.
Character—
Strong and good color.
Good fiber length.
Possible uses—Same as white spruce.

LOWLAND WHITE FIR—Abies grandis. Wt. 23 lbs. Fiber 3.2 m.m.
Range—Coast region from Vancouver Island to California (Mendocino County), and from Washington and Oregon to Northern Idaho and Montana.
Common Names—White fir (Cal., Ore., Idaho); silver fir (Mont., Idaho); yellow fir (Mont., Idaho); Oregon white fir (Cal.); Western white fir; grand or Oregon white fir (Cal. lit.); great California fir (lit).
Sulphite Pulp—
Yield 980 lbs.
Character—

HAMILTON ENGINES



A Prominent HAMILTON Poppet Valve Installation

Since the Beginning

ANY story of HAMILTON Engines would be incomplete without the chapter that tells of Engine Number One.

It was built in 1882 and installed at The Carr Milling Company, Hamilton, Ohio. For thirty years it ran continuously, and then the mill was burned down to the ground, burying Number One in the ruins.

The mill was rebuilt. Number One was cleaned up and ran again, none the worse for its ordeal of fire. That was in 1911.

In 1913 there was a flood which swept over Engine Number One, covering it to a depth of fifteen feet with dirty water and thick yellow slime.

But something had been built into Number One that fire and flood couldn't touch. When the water subsided, it was dug from its muddy bed and again went back to its daily job. Even today Engine Number One is still in perfect running order.

In the meantime, thousands of HAMILTON Engines—HAMILTON Corliss, Uniflow and Poppet Four-Valve—have been built and installed in hundreds of industries. Always where the work is the hardest, where there is the greatest need for power that is absolutely reliable, HAMILTON Engines are on the job.

The Hooven, Owens, Rentschler Co.

Hamilton Engines and Machinery

HAMILTON, OHIO

Rogers and Special Wet Machines

SINGLE AND DOUBLE PRESS
FOR CONVERTING CHEMICAL PULP INTO SHEETS 48% DRY

25-30 TONS air-dry pulp per 24 hours. Built in 72" width only, with patented pulp weakening and separating device or our new automatic knife cut-off attachment.

FREIGHT CHARGES are greatly reduced. Savings on this item alone often pay for the machine in one year.

All infringements will be vigorously prosecuted

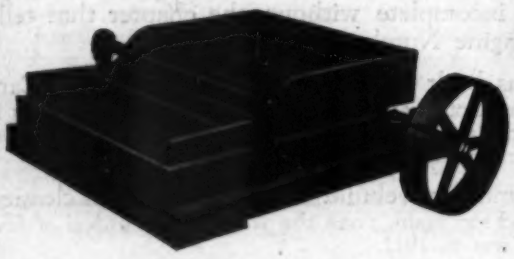
The Wood's Machine

Used as Pulp Thickeners, Savealls, Pulp Washers and Water Filters

ADVANTAGES:

Reduced Wire Costs	No Couch Roll
Enormous Capacity	Minimum Repairs
Only 2 H. P. Required	No Doctor
Works Automatically	Requires No Attention

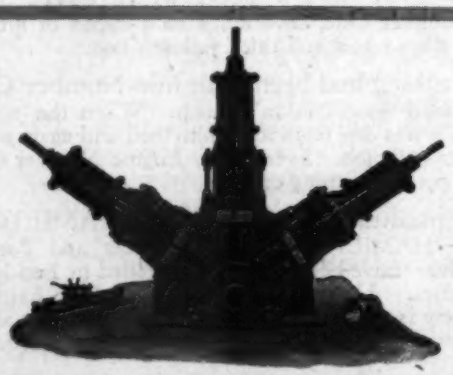
OVER 100 MACHINES SOLD AND IN USE



Wells Undulating Knot and Sliver Screen

Will bear closest investigation from every angle. It separates knots and slivers from all kinds of pulp efficiently, continuously, automatically with negligible cost for operation and upkeep. Simple but rigid construction. Only best materials used. Operation in plain view.

60 TONS DAILY CAPACITY, STANDARD SIZE. WRITE FOR BLUEPRINT AND FURTHER INFORMATION



Standard Wood Pulp Grinder

Built in Three Sizes

Taking wood 24", 30" or 32".
Bridge-trees—Are well proportioned.
Flanges—Made of steel, 40" diameter.
Hydraulic Cylinders—Copper lined, 12", 14" or 16" diameter.
Pillow Blocks—22" length of bearing.
Pockets—Very heavy and designed particularly for free discharge of pulp.
Service—Continuous distinctive service is always assured.

PULP AND PAPER MILL MACHINERY
GLENS FALLS MACHINE WORKS

GLENS FALLS, NEW YORK

OUR LINE IS MANUFACTURED IN CANADA BY
THE NORTHERN FOUNDRY & MACHINE CO., LTD., SAULT STE. MARIE, ONT.

Easily pulped.
Easily bleached.
Fair strength.
Excellent color.
Possible uses—As a substitute for white spruce.
Sulphate Pulp—
Yield 1,140 lbs.
Character—
Good strong grade of kraft pulp.
Possible uses—Same as white spruce.
Mechanical Pulp—
Yield 1,950 lbs.
Character—
Good strength, color and fiber.
Possible uses—Same as white spruce.

NOBLE FIR—Abies nobilis. Wt. 22 lbs. Fiber ———.
Range—Washington (coast mountains in southwestern part of state; Olympic mountains on Solduc river; from Mount Baker southward in the Cascade mountains) to Oregon (Browder ridge on head waters of McKinzie river in Lane county). Range at present but little known.
Common Names—Red fir (Ore.); "larch" (Ore. lumbermen); noble fir (Ore.); big tree; feather red fir (Cal. lit.); noble or bracted red fir (Cal. lit.); tuck tuck (Pacific Indians).
Sulphate Pulp—
Yield 1,010 lbs.
Character—
Easily pulped.
Easily bleached.
Fair strength.
Excellent color.
Possible uses—As a substitute for white spruce.
Sulphate Pulp—
Yield 1,080 lbs.
Character—
Good quality of strong pulp.
Possible uses—As a substitute for white spruce.
Mechanical Pulp—
Yield 1,920 lbs.
Character—
Good color.
Very long strong fiber.
Possible uses—Same as white spruce.

RED FIR—Abies magnifica. Wt. 23 lbs. Fiber ———.
Range—Southern Oregon (Cascade mountains) and California (Mount Shasta and along the western slopes of Sierra Nevada mountains).
Common Names—Red fir (Cal.); California red-bark fir (Cal.); magnificent fir (Cal. lit.); California red fir (Cal. lit.); golden fir (Cal. lit.).
Sulphite Pulp—
Yield 1,080 lbs.
Character—
Easily pulped.
A little hard to bleach.
Good strength.
Fair color.
Possible uses—As a substitute for white spruce.
Sulphite Pulp—
Yield 1,150 lbs.
Character—
Good strong fiber.
Possible uses—Same as white spruce.
Mechanical Pulp—
Yield 1,915 lbs.
Character—
Fair strength.
Pinkish color.
Possible uses—As a substitute for white spruce.

SILVER FIR—Abies amabilis. Wt. 22 lbs. Fiber ———.
Range—From British Columbia (Fraser river and southward in the Cascade mountains) to Washington and Oregon.
Common Names—Red fir; red silver fir (Western mountains); fir (Cal.); lovely fir (Cal. lit.); lovely red fir (Cal. lit.); amabilis or lovely fir (Cal. lit.); "larch" (Oregon lumbermen).
Sulphite Pulp—
Yield 1,060 lbs.
Character—
Easily pulped.
Easily bleached.
Fair strength.
Excellent color.
Possible uses—As a substitute for white spruce.
Sulphate Pulp—
Yield 1,100 lbs.
Character—
Excellent strength.

STEEL
for Immediate Shipment from Stock

For Maintenance, Construction and Repairs

Bars	Boiler Tubes
Shapes	Boiler Fittings
Structurals	Corrugated Sheets
Rails	Concrete Reinforcing
Plates	Welding Rods
Sheets	Babbitt Metal
Rivets	Tool Steel
Bolts	Bar Iron
Nails	Refined Iron
Wire	Floor Plates
Chain	Safety Treads
Turnbuckles	Small Tools
Shafting	Machine Tools, etc.

Write for the Ryerson Journal and Stock List —the "Key" to Immediate Steel

JOSEPH T RYERSON & SON INC
CHICAGO CINCINNATI BUFFALO
ST. LOUIS DETROIT NEW YORK

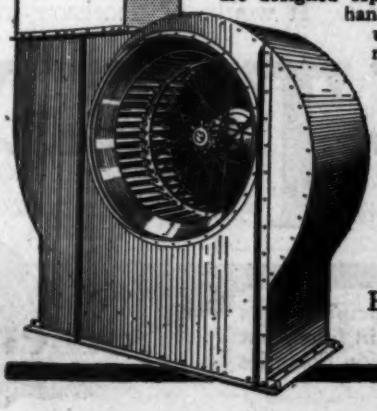
EFFICIENT VENTILATION

Can be obtained only through the use of equipment designed to meet the specific requirements for which it is intended.

Bayley

Plexiform Fans

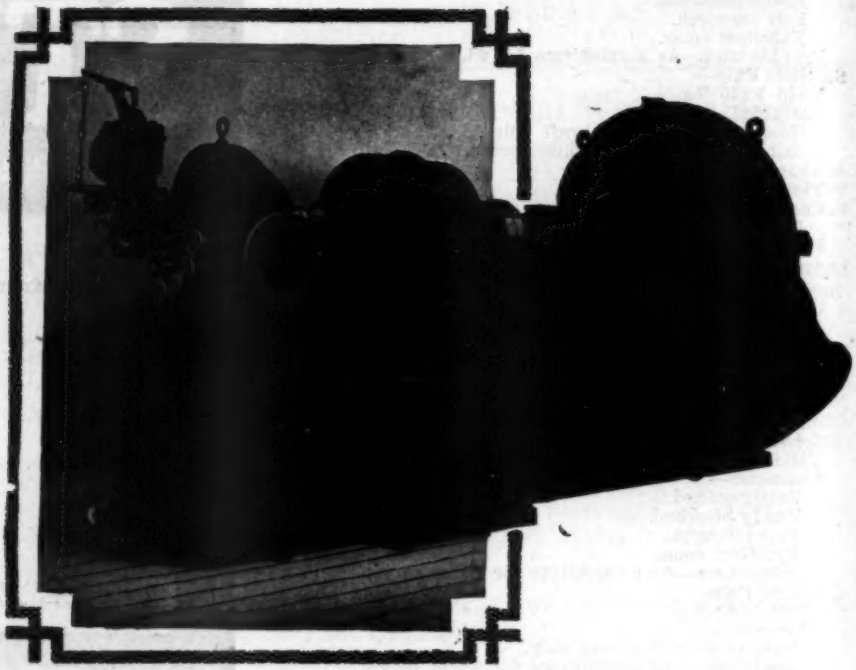
are made in a variety of capacities, from 300 to 300,000 cubic feet per minute. They are designed especially with a view of handling a maximum volume of air from a minimum of space and power requirement. Their efficiency as proved by installations in thousands of the largest industrial, public, school, theatre and office buildings, makes them prime favorites with architects engineers and owners.



Write for Catalog

Bayley Mfg. Co.
Dept. (B)
Milwaukee, Wis.

Where



DEPENDABILITY PAYS

THERE are two auxiliary units in the power plant which cannot shut down without causing an interruption of service of the main unit or units which they serve. Even standby apparatus cannot be started soon enough to prevent an interruption.

The above illustration shows a Terry turbine-driven geared condenser circulating pump which was supplied to the Chile Exploration Co. If this unit should shut down, the main unit which it serves would run non-condensing momentarily, heating the condenser shell so that it would be dangerous or ruinous to the condenser to start up a standby unit. It would be necessary to shut down the main unit long enough to permit the condenser shell to slowly cool to the proper temperature.

Turbines are chosen for this class of service primarily because of their inherent dependability. They receive their energy directly from the boiler, avoiding the cycle of main unit or house turbine, generator, switchboard, fuses and wiring required by motors.

Terry Turbines are specified because of their many features of simplicity, durability and the small amount of attention required to keep them in efficient operation.

Investigate these features, and for your plant, specify

T-763

THE TERRY TURBINE

Offices in Principal Cities in U.S.A. also in Important Industrial Foreign Countries

The Terry Steam Turbine Co.
Terry Sq. Hartford, Conn. U.S.A.

Long fiber.
Possible uses—Same as white spruce.
Mechanical Pulp—
Yield 1,870 lbs.
Character—
Long fiber of excellent strength.
Color slightly grayish.
Possible uses—Same as white spruce.

WHITE FIR—Abies concolor. Wt. 22 lbs. Fiber 3.5 m.m.
Range—Oregon (Siskiyou mountains) to southern California (San Bernardino county); northern Arizona and New Mexico to Colorado and Utah (Wasatch mountains).
Common Names—White fir (Cal., Idaho, Utah, Colo.); balsam fir (Cal., Idaho, Colo.); silver fir (Cal.); balsam (Cal.); (white balsam (Utah; bastard pine (Utah); balsam-tree (Idaho); black gum (Utah); California white fir (Cal.); Colorado white fir (Cal. lit.); concolor silver fir (Eng. lit.).
Sulphite Pulp—
Yield 950 lbs.
Character—
Easily pulped.
Easily bleached.
Good strength.
Good color.
Possible uses—As a substitute for white spruce.
Sulphate Pulp—
Yield 1,100 lbs.
Character—
Good strong grade of kraft pulp.
Possible uses—Same as white spruce.
Mechanical Pulp—
Yield 2,010 lbs.
Character—
Fair strength.
Good fiber.
Satisfactory color.
Possible uses—Same as white spruce.

DOUGLAS FIR—Pseudotsuga taxifolia.
Washington and Oregon, wt. 28 lbs. Fiber 4.4 m.m.
Montana and Wyoming, wt. 25 lbs. Fiber ———.
Range—From the Rocky mountain region (in United States) and northward to central British Columbia; Pacific coast.
Common Names—Red fir (Ore., Wash., Idaho, Utah, Mont., Colo.); Douglas spruce (Cal., Colo., Mont.); Douglas fir (Utah, Ore., Colo.); yellow fir (Ore., Mont., Idaho, Wash.); spruce (Mont.); fir (Mont.); Oregon pine (Cal., Wash., Ore.); red pine (Utah, Idaho, Colo.); Puget sound pine (Wash.); Douglas-tree; cork-barked Douglas spruce.
Sulphite Pulp—
Yield 1,200 lbs.
Character—
Hard to pulp.
Difficult to bleach.
Fair strength.
Poor color
Pitchy.
Possible uses—Few.
Sulphate Pulp—
Yield 1,170 lbs.
Character—
Good grade of kraft pulp but not as strong as white spruce.
Possible uses—Similar to white spruce.
Mechanical Pulp—
Because of high pitch content is probably unsuitable for this purpose.

CAROLINA HEMLOCK—Tsuga caroliniana. Wt. 30 lbs. Fiber ———.
Range—Mountains of southwestern Virginia, western North Carolina and northern Georgia; very local.
Common Names—Hemlock (N. C., S. C.); southern hemlock (lit.).
Sulphite Pulp—
Yield 1,290 lbs.
Character—
Fairly easily pulped.
A little hard to bleach.
Good strength and fair color.
Possible uses—As a substitute for white spruce.
Sulphate Pulp—
Yield 1,260 lbs.
Character—
Good strong pulp.
Possible uses—As a substitute for white spruce.
Mechanical Pulp—
Probably the same as hemlock.

HEMLOCK—Tsuga canadensis. Wt. 24 lbs. Fiber 3.0 m.m.

Announcement

to the

Paper and Pulp Industry

Bitumastic Solution and Hermastic Enamels have for a number of years been used satisfactorily in numerous industries, for the protection of metal surfaces coming in contact with atmospheric conditions which are conducive to corrosion.

So busy have we been supplying the demands of other industries that, until recently when paper and pulp mills began to make inquiry about our coatings, we have somewhat neglected this field. We are now, however, prepared to discuss your problems of corrosion and their possible elimination.

BITUMASTIC

WHAT IT IS

This material is a black, Bituminous composition, which has been found to be very satisfactory when subjected to moisture such as condensed steam, acid fumes and vapors. Used on hot steam pipes, boiler fronts, smoke stacks, and all kinds of structural steel surfaces, air ducts, ventilating fans, tanks, digesters and all such places where the corrosive conditions are severe and where constant repainting is necessary in order to preserve the surfaces from rapid corrosion.

It is applied the same as ordinary paint; dries quite hard in five hours; gives a lasting, brilliant black finish. It costs about fifty per cent less than a good lead and oil paint.

HERMASTIC

WHAT IT IS

This material is used quite generally in industrial plants for lining steel coal bunkers and ash hoppers, where, as every engineer knows, corrosion is very rapid.

It is applied in the following manner: The surface of the steel is thoroughly cleaned and dried and a priming coat of W. D. H. Priming Solution is applied cold like ordinary paint. This is allowed to set for about five hours after which the Hermastic Enamel is applied by means of Special Tampico fibre daubers, while in a hot molten condition. It leaves a coating on the steel of about 1/8" thickness and insures lasting protection to the inside of the coal bunkers. Due to its very high melting point it neither sags under extreme heat nor cracks under extreme cold.

Wailes Dove-Hermiston Corporation
17 Battery Place, New York

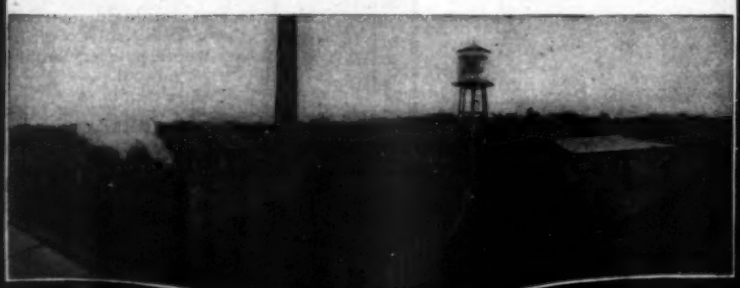
322 So. Delaware Ave. Philadelphia
Kirby Building Cleveland

We are STILL furnishing
FOURDRINIER WIRES
to the Paper Mills which used APPLETON WIRES No. 1, No. 2 and No. 3, shipped 27 years ago this spring

They tell us that
"Appleton Wires Are Good Wires"
in fact the best they have run

Fourdrinier Wires
Cylinder Wires
Washer Wires
Save-All Wires
In Brass and Phosphor Bronze

APPLETON WIRE WORKS
Appleton, Wis., U. S. A.

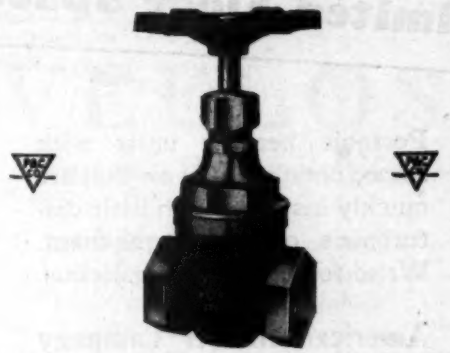


Range—Nova Scotia to Minnesota (Carleton county), Wisconsin, Michigan and southward in the Atlantic region along the mountains to northern Alabama (Winston county) and Georgia.
Common Names—Hemlock (Me., N. H., Vt., Mass., R. I., Conn., N. Y., N. J., Pa., Del., Va., N. C., S. C., Ky., Wis., Mich., Minn., Ohio, Ont.); hemlock spruce (Vt., R. I., N. Y., Pa., N. J., W. Va., N. C., S. C., England, cult.); spruce (Pa., W. Va.); spruce pine (Pa., Del., Va., N. C., Ga.); (Oh-neh-tah—"Greens on the stick" (N. Y. Indians); Canadian hemlock (lit.); New England hemlock (lit.).
Sulphite Pulp—
Yield 1,080 lbs.
Character—
Not easily pulped.
A little hard to bleach.
Good strength.
Fair color.
Possible uses—As a substitute for white spruce.
Sulphate Pulp—
Yield 1,150 lbs.
Character—
Good strong pulp.
Possible uses—Similar to white spruce.
Mechanical Pulp—
Yield 2,030 lbs.
Character—
Short fiber.
Pinkish color.
Possible uses—As a substitute for white spruce.

WESTERN HEMLOCK—Tsuga heterophylla. Wt. 23 lbs. Fiber 2.7 m.m.
Range—Alaska to Idaho and Montana and southward (in the Cascade and Coast ranges) to California (Marin county).
Common Names—Hemlock spruce (Cal.); western hemlock (Cal.); hemlock (Ore., Idaho, Wash.); western hemlock spruce (lit.); California hemlock spruce; western hemlock fir (Eng.); Prince Albert's fir (Eng.); Alaska pine (northwestern lumbermen).
Sulphite Pulp—
Yield 1,050 lbs.
Character—
Easily pulped.
Easily bleached.
Good strength.
Fair color.
Possible uses—Same as white spruce.
Sulphate Pulp—
Yield 1,100 lbs.
Character—
Good strong fiber.
Possible uses—Similar to white spruce.
Mechanical Pulp—
Yield 2,150 lbs.
Character—
Good strength and fiber.
Grayish color.
Possible uses—Similar to white spruce.

TAMARACK—Larix laricina. Wt. 31 lbs. Fiber 2.6 m.m.
Range—From Newfoundland and Labrador to northern Pennsylvania, northern Indiana, Illinois, central Minnesota and northwestward to Hudson bay (Cape Churchill, Great Bear lake and Mackenzie river) (in Arctic circle).
Common Names—Larch (Vt., Mass., R. I., Conn., N. Y., N. J., Pa., Del., Wis., Minn., Ohio, Ont.); tamarack (Me., N. H., Vt., Mass., R. I., N. Y., N. J., Pa., Ind., Ill., Wis., Mich., Minn., Ohio, Ont.); hackmatack (Me., N. H., Mass., R. I., Del. Ill., Minn., Ont.); American larch (Vt., Wis., nurserymen); juniper (Me., N. Bruns. to Hudson bay); black larch (Minn.); epinette rouge (Quebec); Ka-neh-tens—"The leaves fall" (Indians, N. Y.); red larch (Mich.); hacmac (lit.).
Sulphite Pulp—
Yield 1,270 lbs.
Character—
Difficult to pulp.
Difficult to bleach.
Good strength.
Poor color.
Possible uses—Low grade wrappings.
Sulphate Pulp—
Yield 1,400 lbs.
Character—
Strong, tough pulp.
Possible uses—Similar to white spruce.
Mechanical Pulp—
Yield 2,620 lbs.
Character—

PRATT & CADY VALVES



Pratt & Cady bronze gate valves for 150 and 250 pounds steam working pressure have seat rings which are renewable without removing the valve from the line. The wedges in these valves are symmetrical and so may be reversed. When they are worn on both sides the wedges may be replaced as they are made to gauge and replacement wedges will fit.

Reading Steel Casting Co., Inc.
Pratt & Cady Division
General Sales Office: Bridgeport, Conn.
829 Connecticut Avenue
An Associate Company of the American Chain Co., Inc.

Made for maximum service not merely the lowest

TRADE JENKINS MARK
Jenkins Bros.

Check Valves

Fig. 118, screwed, Standard Bronze Angle Check Valve

Fig. 352, screwed Standard Bronze Swing Check Valve

The Jenkins Renewable Disc with which Jenkins Horizontal, Angle, Vertical, and Swing Check Valves are fitted, forms a perfect contact on the seat. The disc gives long service, but, when necessary, can be easily and quickly renewed.

Jenkins Valves are made in types and sizes for all requirements. At supply houses everywhere.

JENKINS BROS.
New York Boston Philadelphia Chicago
Montreal London
FACTORIES: Bridgeport, Conn.; Elizabeth N. J.; Montreal, Canada.

Always marked with the "Diamond"
Jenkins Valves
SINCE 1864

Heating Units for Limited Floor Space

Portable heating units with forced circulation of air that are quickly installed with little disturbance of your equipment. Write for descriptive bulletins.

American Blower Company
Detroit

Branches in All Principal Cities

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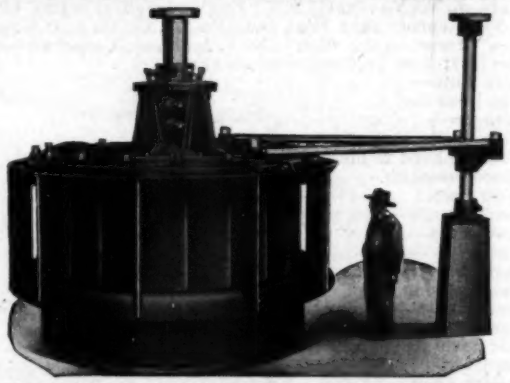
Windsor, Ont.

(314)

American Blower

LEFFEL
TURBINE WATER WHEELS



HIGH SPEEDS, HIGH POWERS, HIGH EFFICIENCIES

All of our turbines are designed and built to suit location and requirements, by engineers and experts who have had years of experience in this particular line of work. Turbines fully guaranteed.

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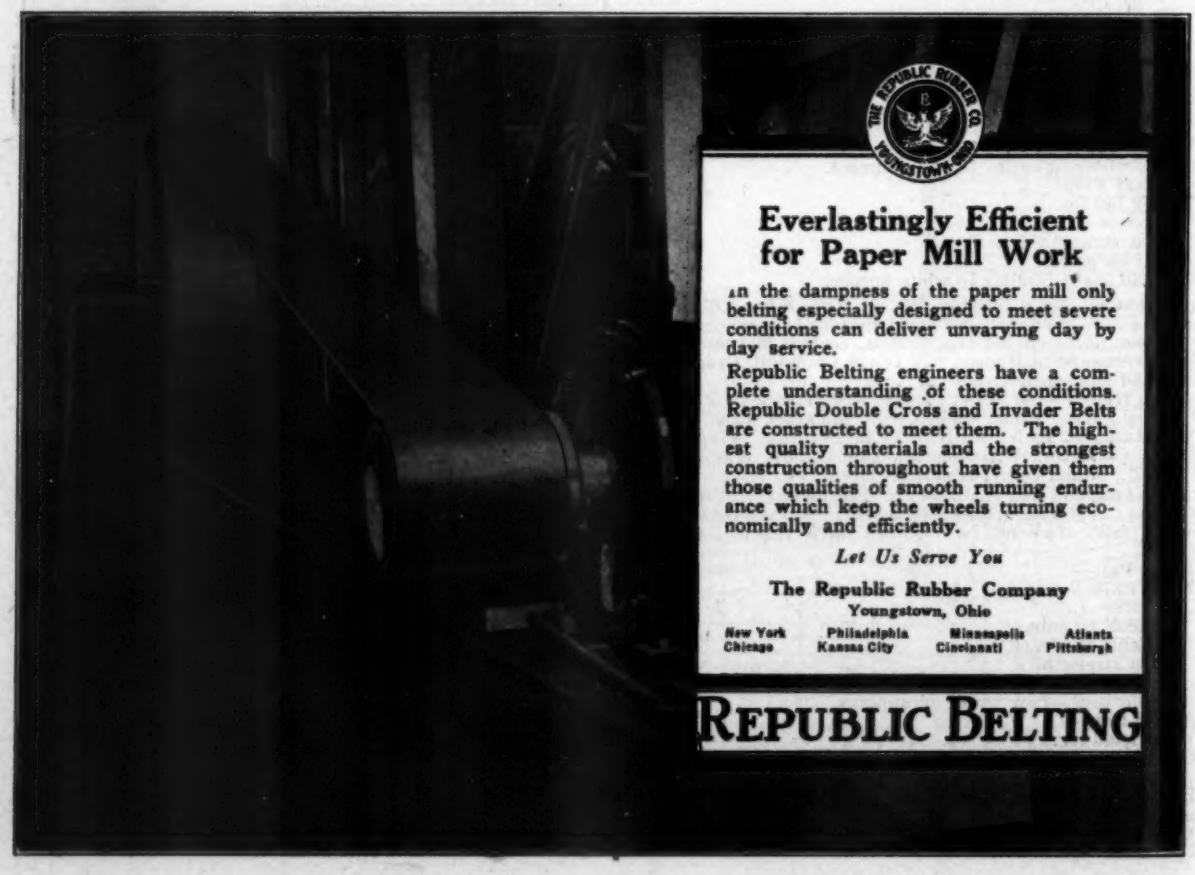
PETERBOROUGH, ONT., CANADA...William Hamilton Co., Ltd.



THE REPUBLIC RUBBER CO. YOUNGSTOWN, OHIO

Everlastingly Efficient for Paper Mill Work

In the dampness of the paper mill only belting especially designed to meet severe conditions can deliver unvarying day by day service.

Republic Belting engineers have a complete understanding of these conditions. Republic Double Cross and Invader Belts are constructed to meet them. The highest quality materials and the strongest construction throughout have given them those qualities of smooth running endurance which keep the wheels turning economically and efficiently.

Let Us Serve You

The Republic Rubber Company
Youngstown, Ohio

New York Chicago Philadelphia Kansas City Minneapolis Cincinnati Atlanta Pittsburgh

REPUBLIC BELTING

Short fibered and gray color.
Possible uses—As a substitute for white spruce.

WESTERN LARCH—Larix occidentalis. Wt. 28 lbs. Fiber 2.6 m.m.
Range—Southern British Columbia (south of latitude 53 degrees) and south in the Cascade mountains to the Columbia river and to western Montana; also in Blue mountains of Washington and Oregon.
Common Names—Tamarack (Ore.); hackmatack; larch (Idaho, Wash., etc.); red American larch; western tamarack; western larch (Eng.); great western larch (Cal. lit.).
Sulphite Pulp—
Yield 1,200 lbs.
Character—
Difficult to pulp.
Difficult to bleach.
Poor strength and color.
Possible uses—Low grade wrappings.
Sulphate Pulp—
Yield 1,290 lbs.
Character—
Good quality of kraft fiber.
Possible uses—Same as white spruce.
Mechanical Pulp—
Yield 2,100 lbs.
Character—
Brown color, short fiber and fair strength.
Possible uses—Where a medium quality of groundwood will answer the purpose.

INCENSE CEDAR—Libocedrus decurrens. Wt. 23 lbs. Fiber 2.0 m.m.
Range—From Oregon (North fork of Sanitam river and southward on the western slopes of the Cascade mountains through California (western slopes of Sierra Nevada mountains and Coast ranges from southern border of Mendocino county to San Bernardino, San Jacinto and Cuyamaca mountains); western Nevada; Lower California (Mount San Pedro Martir).
Common Names—White cedar (Cal., Ore.); cedar (Cal., Ore.); incense cedar (Cal., Ore.); post cedar (Cal., Nev.); juniper (Nev.); bastard cedar (Cal., Wash.); red cedar; California post cedar (Cal. lit.).
Sulphite Pulp—
Yield 920 lbs.
Character—
Difficult to bleach.
Good strength.
Poor color.
Possible uses—Few.
Sulphate Pulp—
Yield 950 lbs.
Character—
Strong and hard fiber.
Dark colored.
Possible uses—As a substitute for white spruce.

PORT ORFORD CEDAR—Chamaecyparis lawsoniana. Wt. 26 lbs. Fiber 3.6 m.m.
Range—Coast region from southwestern Oregon (Coos bay) to California (Klamath river), extending inland about 40 miles.
Common Names—Port Orford cedar (Ore., Cal.); Oregon cedar (Ore., Cal.); white cedar (Ore., Cal.); ginger pine (Cal.); Lawson's cypress (Ore., Cal.).
Sulphite Pulp—
Yield 1,150 lbs.
Character—
Fairly easily pulped.
Rather difficult to bleach.
Fair strength and color.
Possible uses—Same as white spruce.
Sulphate Pulp—
Yield 960 lbs.
Character—
Difficult to pulp and bleach.
Good strength.
Hard and fine fiber.
Possible uses—Same as white spruce.

RED CEDAR—Juniperus virginiana. Wt. 27 lbs. Fiber 2.8 m.m.
Range—Nova Scotia and New Brunswick to Florida and west in Ontario (Georgian bay) to Dakota, central Nebraska and Kansas, and Indian Territory. Actual range imperfectly known at present, the supposed Rocky mountain and western range being represented by a new, distinct species (J. scopularum Sarg.).

VEELOS
TRADE MARK REGISTERED U.S. PAT. OFFICE
JUNE 21st, 1910

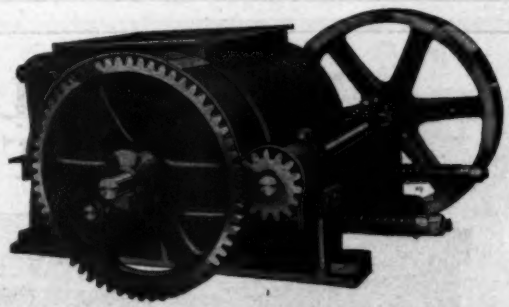
VEELOS
Genuine Balata Belting

The Ideal Belt for Paper Mills
Waterproof—Wear-resisting
Non-Stretching—Non-Slipping
Durable—Reliable—Economical

Try a VEELOS. QUALITY will tell
You will always use it

THE STANDARD BELT OF THE WORLD

Manheim Manufacturing & Belting Co.
Manheim, Pa.



A Webster Coal Crusher in Your Power Plant

will insure a regular supply of properly sized coal for your automatic stokers at a low cost per ton.

They are built in single and double roll types, in capacities to handle 30 to 200 tons per hour.

Shall we send you our catalog showing our various types and sizes of coal crushers?

THE WEBSTER MFG. CO.
4500-4560 Cortland Street
CHICAGO, ILL.
Factories, Tiffin, O., & Chicago. Sales Offices in Principal Cities.

Super Calender 52" Wide, 7 Rolls

Made by Holyoke Machine Co.
Bottom roll 18"x54", journals 9"x15".
Two intermediate chilled iron rolls 10"x54".
Two new cotton rolls 14"x52".
Top roll 14"x54"
Equipped with levers and weights.
Two shaft revolving winder.
Drive fast and slow speed.
Weight, approximately 38,000 lbs.

PRICE, $4,000.00

This stack will take nine rolls and we can furnish the two additional rolls if desired.

Overhauled and ready for delivery

FRANK H. DAVIS COMPANY
175 RICHDALE AVE., CAMBRIDGE, MASS.

Established 1828
The
Smith & Winchester Mfg. Co.
SOUTH WINDHAM, CONN.

Manufacturers of

Paper Making Machinery

Paper Bag Making Machinery

The Undercut Trimmer

Die Cutting Presses

Overcut Cutters

Let Us Quote on Your Requirements

"HALLOWELL" Steel Lift Truck Platform

"Hallowell" Steel Lift Truck Platforms represent an attractive low ultimate cost

BECAUSE

they not only last indefinitely but also serve to practically eliminate repairs, an everlasting and expensive necessity with the all wooden construction.

The "Hallowell" is used extensively, many of the largest and most representative concerns in their lines being among those who have adopted it as their standard.

WRITE FOR BULLETIN and learn more about the "Hallowell"—it will pay you.

Manufactured by

Standard Pressed Steel Co., Jenkintown, Pa.

The "Pioneer" Steel Hanger people

Common Names—Red cedar (N. H., Vt., Mass., R. I., N. Y., N. J., Pa., Del., Va., W. Va., N. C., S. C., Ga., Fla., Ala., Miss., La., Ky., Mo., Ill., Ind., Wis., Iowa, Ohio, Ont., Mich., Minn.); cedar (Conn., Pa., N. J., S. C., Ky., Ill., Iowa, Ohio); savin (Mass., R. I., N. Y., Pa., Minn.); juniper (N. Y., Pa.); juniper bush (Minn.); cedre (La.).

Sulphite Pulp—
Yield 1,300 lbs.
Character—
Difficult to pulp and bleach.
Very shivy and dark colored.
Possible uses—Few.

Sulphate Pulp—
Yield 1,000 lbs.
Character—
Difficult to pulp and bleach.
Shivy but fairly strong and fine fibered.
Possible uses—Wrappings.

WESTERN RED CEDAR—Thuja plicata. Wt. 19 lbs. Fiber 3.8 m.m.

Range—From coast of southern Alaska to northern California (Mendocino county); eastward through British Columbia and northern Washington to northern Idaho (Coeur d'Alene, Bitter Root and Salmon river mountains) and Montana; western slopes Rocky mountains.

Common Names—Red cedar (Idaho, Ore., Wash.); canoe cedar (Ore., Wash.); arborvitae (Cal.); shinglewood (Idaho); gigantic cedar (Cal.); cedar (Ore.); gigantic red cedar (Cal. lit.); western cedar; gigantic or Pacific red cedar (Cal. lit.); Lobb's arborvitae (in cult. Eng.); Pacific red cedar (Cal. lit.).

Sulphite Pulp—
Yield 830 lbs.
Character—
Difficult to bleach.
Dark colored but fair strength.
Possible uses—Few.

Sulphate Pulp—
Yield 830 lbs.
Character—
Rather difficult to bleach.
Fair strength.
Possible uses—Same as white spruce.

SOUTHERN WHITE CEDAR—Chamaecyparis thyoides. Wt. 20 lbs. Fiber 2.1 m.m.

Range—Coast region from southern Maine to northern Florida and westward to Mississippi (Pearl river).

Common Names—White cedar (Mass., R. I., N. Y., N. J., Pa., Del., N. C., S. C., Fla., Ala., Miss.); swamp cedar (Del.); post cedar (Del.); juniper (Ala., N. C., Va.).

Sulphite Pulp—
Yield 1,000 lbs.
Character—
Fairly easy to pulp.
Rather difficult to bleach.
Fair strength and color.

Sulphate Pulp—
Yield 780 lbs.
Character—
Readily pulped.
Difficult to bleach.
Hard and fine fiber.
Possible uses—As a substitute for spruce.

BALD CYPRESS—Taxodium distichum. Wt. 27 lbs. Fiber 3.3 m.m.

Range—From southern Delaware (Sussex county and southward in the coast region) to Florida (Mosquito inlet and Cape Roman); westward in the Gulf coast region to Texas (Devils river), and northward through Louisiana, Arkansas and eastern Mississippi and Tennessee, southeastern Missouri, western and northwestern Kentucky, southern Illinois and southwestern Indiana (Knox county).

Common Names—Bald cypress (Del., N. C., S. C., Ala., La., Fla., Tex., Ark., Mo., Ill., Ind.); white cypress (N. C., S. C., Fla., Miss.); black cypress (N. C., S. C., Ala., Tex.); red cypress (Ga., Miss., La., Tex.); swamp cypress (La.); cypress (Del., N. C., S. C., Fla., Miss., Ky., Mo., Ill.); deciduous cypress (Del., Ill., Tex.); southern cypress (Ala.).

Sulphite Pulp—
Yield 1,160 lbs.
Character—
Difficult to cook.
Very difficult to bleach.
Poor strength and color.
Possible uses—Few.

Sulphate Pulp—
Yield 1,350 lbs.

YOUR COPY IS READY

The new catalog illustrating the various Saw Steel Products manufactured by the Simonds Saw and Steel Company, containing information covering Saws, Knives, Files and Steel with prices, is just off the press. You should have a copy on file for future reference. Send us your name and address and have your copy forwarded now.

SIMONDS SAW AND STEEL CO.
Fitchburg, Mass. Chicago, Ill.
Detroit, Mich.

PAPER CUTTERS
Single, Duplex, and Diagonal

CUTTER KNIVES
PATENT TOP SLITTERS

Hamblet Machine Co.
LAWRENCE, MASS.

BROWN-WALES CO.
SELAW
IRON & STEEL

"Headquarters in New England" for Over Fifty Years

More than fifty years of serving New England with iron, steel and kindred materials for manufacturing, building and repairing has established our title of "Headquarters in New England."

Fair prices, large stocks and the fastest delivery in New England are important factors of "Headquarters" service. Write today for handbook of lines and stocks carried.

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BACK TO NORMALCY

Owing to substantial reductions in the cost of all materials entering into the construction of Jenssen Acid Towers, we are now building them at

NORMAL PRICES

Will YOU let us show YOU how to make MONEY by making a

BETTER ACID

Don't forget that every second sulphite mill on this continent is using our towers, so ask your neighbor what HE thinks of them.

G. D. JENSSEN CO.
200 5TH AVE. NEW YORK, N. Y.

Guaranteed Perfect

Draper Hollow Balanced Brass Balls

FOR STUFF PUMPS

Absolutely balanced; will not pound out of shape

Specify these when ordering new pumps.

Order these to replace worn-out balls.

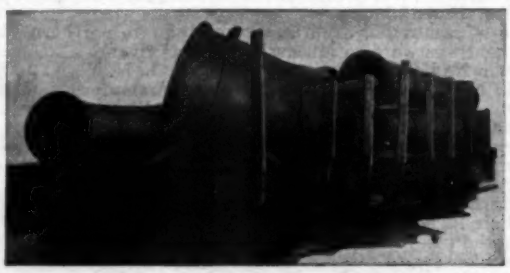
We make a specialty of repairing stuff pump balls.

We also manufacture—
SOLID BRASS BALLS
IRON AND STEEL BALLS
BALL CHECK VALVES
VALVE FACING TOOLS

The Draper Manufacturing Co.

Port Huron, Mich. — Petrolea, Canada

Every ball bears our registered trade-mark



When in need of penstock work, pressure or storage tanks, boilers and breechings, specify Manitowoc. This work receives the same careful attention as the construction of Manitowoc digesters, and cooking boilers. Plates are carefully shaped, accurately fitted and securely riveted—by experienced workmen.

Let us bid on your requirements

Manitowoc Engineering Works

Designers and builders of Disc Evaporators, Diffusers, Digesters, Cylindrical and Globe Rotary Cooking Boilers, Experimental Digesters, Paulson Barking Drums, Howard Refiners, Autoclaves, Incinerators, Wash Tanks, Caustisizing Tanks, Blow-pipes, Bleach and Clay Mixtures, etc.

MANITOWOC, WISCONSIN

Character—
Fiber long but tender.
Possible uses—As a substitute for white spruce.
(To be concluded in August issue)

Recent Publications

What a Buckeye Cover Man Saw in Europe

In commemoration of their seventy-fifth year of existence the Beckett Paper Company, of Hamilton, Ohio, has issued an elaborate 200-page book on "What a Buckeye Cover Man Saw in Europe."

The particular "Buckeye Cover Man" referred to in the title is Carl R. Greer, who naturally is the author of the book. In introducing his work Mr. Greer writes in part as follows:

"We present it with a good deal of diffidence, but we claim for it the merit of novelty. There was never another book like it. We cannot tell ourselves whether it is a book of travel, a paper-mill story or an advertisement. Its classification, as to both genus and species, we pass on to our friends or some future bibliographer."

It so happens that we consider ourselves as friends of the company and would like to retain the honor, so we too pass the task of classifying this work on down the line to the above-mentioned bibliographer. We do wish to say this, however, in spite of the fact that we shirk the duty of classifying, the book is indeed novel and exceptionally easy to read and enjoy, the greater part of it being devoted to an account of Mr. Greer's travels. This account is enlivened with photographic illustrations so well selected and arranged that practically every step of the journey is visualized to the reader.

The story itself is written in a chatty, personal style.

A portion of the book is devoted to the early history of the Beckett Paper Company. These chapters were prepared by Thomas Beckett, president of the company.

A Symbol of Safety

"A Symbol of Safety," by Harry Chase Brearley, has recently been published and copyrighted by Underwriters' Laboratories, Inc. This 300-page book gives a more than casual glimpse behind the scenes of a notable institution organized for service—not profit.

The growth of the Underwriters' Laboratories has been truly a remarkable growth which, according to W. H. Merrill, president of the company, is due solely to the fact that their work is the fulfilment of a decided human and industrial need.

The book is well illustrated and throws much light on the workings of experiments which have removed the hazard from numerous phases of numerous industries.

The China Clay Works in Cornwall & Devon

English China Clays, Ltd., St. Austell, Cornwall, England, has published a handsome brochure for the purpose of familiarizing its trade with the company—its magnitude and operations involved in the preparation of English China clays.

This most elaborate piece is largely photographic illustrations—and every picture is a story.

Upon perusal the reader meets a number of notable and interesting characters; he is carried to the depths of the large clay pits of the world, from where he looks up to the great mounds of clay waiting to be prepared for use; he views many of the kilns where vast quantities of clay are drying and finds himself in a new atmosphere with every leaf turned.

A very, very fine piece of advertising.

Trade and Industry of Finland

A massive book called "Trade and Industry of Finland," containing seven hundred and fifty 10-inch by 12-inch pages, has been distributed upon suggestion of the Finnish Trade Commission. This is perhaps the most complete work ever published treating with the industries of any country, and is a decided credit to its publishers and industrial Finland.

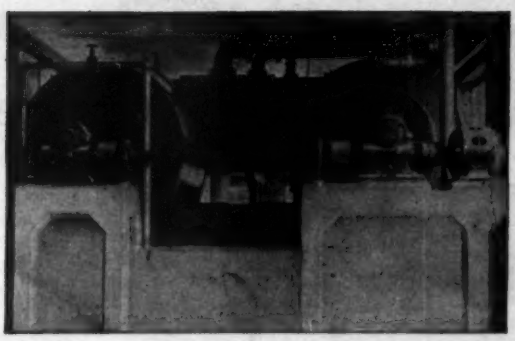
One cannot turn the pages of this book without being impressed with the greatness of this small country's resources and productive activities, saying nothing of its rugged beauty, which is illustrated with nicely reproduced photographs.

The large part of the book is devoted to separate histories and descriptions of the individual companies of Finland, paper and pulp mills being very much in evidence.

Financial and Operating Ratios in Management

The Ronald Press Company has recently published "Financial and Operating Ratios in Management," by James H. Bliss. This 396-page book is divided into two general classes, namely, analysis of financial statements for executive control, and statistics showing financial and operating standards in various industries. Under these two divisions the fundamentals regarding financial and operating ratios are discussed.

The book points the way to control of a business through a group of ratios and turnovers, shows how to construct these



Cleveland Worm Gear Reduction Units applied to Knot Screens. Motor 3 H. P., 860 R. P. M. Ratio in Worm Drive 32-1

Speed Reduction by a method that insures High Efficiency and Economy

Investigation has convinced us that we can save you individually and as an industry thousands of dollars annually

(1) By increasing efficiency in speed reduction.

(2) By lengthening the life of machinery operated through speed reducing elements, through increased evenness of torque and freedom from vibration.

(3) By lowering maintenance cost in man power required as well as in actual replacement cost.

(4) By astonishing reduction in noise.

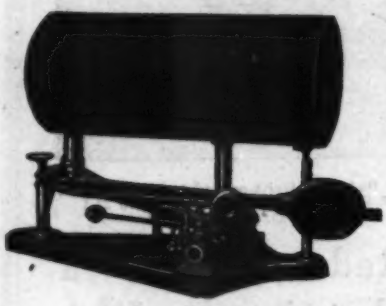
These facts can all be proven. One installation in your plant will be sufficient to demonstrate the truth of our claims and make you eager for more.

Write us at once for real information on modern worm gearing.

The Cleveland Worm & Gear Co.
America's Worm Gear Specialists
CLEVELAND, OHIO

Cleveland
WORM GEAR
REDUCTION UNITS

A Thin Film of Moisture May Be Cutting Your Profits in Two



Millions of dollars are lost each year in the paper industry, because of imperfect drainage. Films of condensation collect on the interior surfaces of the steam coils of dryers, evaporators and paper machines. It insulates against heat radiation, cools the machines and cuts production far below rated capacity.

Morehead Back-to-Boiler Systems prevent this loss by draining condensation as it forms. They keep the heating surfaces dry, permit free circulation and keep the machines at the highest temperature.

The condensation is returned to the boilers without pumps at temperatures as high as 340 degrees.

In many cases Morehead Systems have increased production as much as 40% or made possible corresponding fuel savings. What we have done for others we can do for you. Write.

Morehead Mfg. Company

Dept. O Detroit, Mich.
(106)

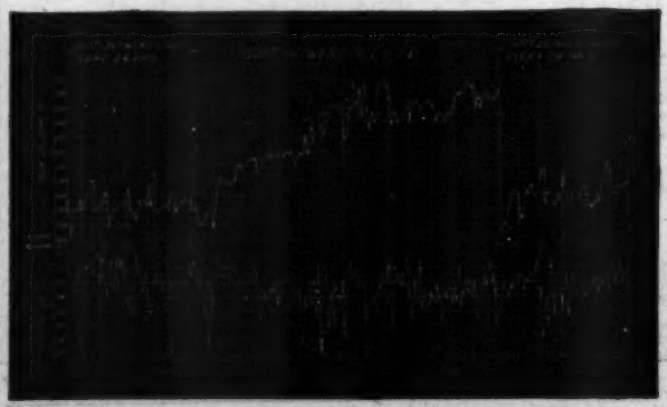
Morehead

"BACK – TO – BOILER – SYSTEM"

POSITIVELY DRAINS ALL TYPES OF STEAM APPARATUS. DELIVERS CONDENSATION AND FEED WATER TO BOILERS UNDER ALL CONDITIONS AT MAXIMUM TEMPERATURE

For Cheaper Steam Production Use Diamond Soot Blowers

The chart above covers the results of a test made by a public utility on a 780 H. P. vertical water tube boiler, 225 lbs. pressure, 130° superheat. The soot blowers were used once a day for a period of eight days after which the boiler was allowed to go without cleaning for thirty days.



It will be noted that as soon as operation of the soot blowers was discontinued, the temperature rose daily from an average of about 545° to about 680° at the end of the nineteenth day after which it maintained this same average for the succeeding eleven days. When the blowers were again operated an immediate drop in temperature occurred from 680° to an average of 560° for the succeeding eight days. It will be seen that the load was fairly uniform throughout the test.

The extent to which Diamond soot blowers thus reduces the cost of steam production is obvious. The fuel saved by reducing the flue gas temperatures may be estimated at 1% for each 20° to 30° drop in flue gas temperature, depending upon the amount of excess air in the chimney gases.

On the basis of fuel saving, Diamond soot blowers are one of the best paying investments in the power plant. They pay for themselves many times over during their period of service.

Send data regarding your boiler equipment and write for full information. Ask for Bulletin 297

DIAMOND POWER SPECIALTY CORPORATION
Detroit, Michigan

Diamond

Soot Blowers - Save 4 to 8% Fuel

for a particular concern or industry, and gives tables of characteristic ratios in various industries for use as comparative standards. Business executives will find this work of much value for the definite and concrete standards it establishes for measuring managerial efficiency.

Other Publications

The level fuel bed Detroit multiple retort underfeed stoker, which has attracted wide attention in the power plant field, is illustrated and described in detail in a new bulletin, "Built on Advanced Engineering Principles," just published by the Detroit Stoker Company, Detroit, Mich. The new bulletin is perhaps one of the most interesting and attractive publications in the power plant field.

The Reprint and Circular Series of the National Research Council (No. 44), has just been prepared by Clarence J. West for the Committee on Research Chemicals Division of Chemistry and Chemical Technology. The pamphlet contains compilations of very complete listings of the following:

List of manufacturers, research chemicals, biological stains and indicators, vital stains, hydrogen ion indicators.

The color using trades will be glad to know that the National Aniline & Chemical Company, Inc., New York City, has just issued its semi-annual booklet of Dyer's Formulas.

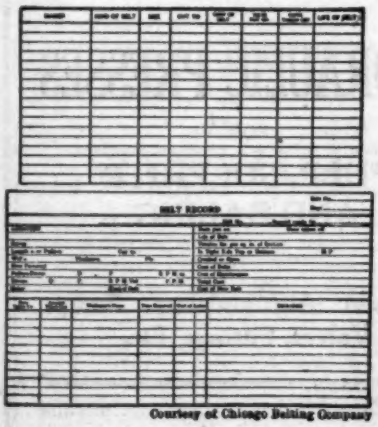
The National Committee for the Prevention of Blindness, 130 East Twenty-second Street, New York City, has issued a report of the conditions discovered during an investigation covering every state in the Union and every industrial occupation in which there is an accident hazard. This report is for distribution among industrial executives, superintendents, foremen and safety engineers.

The Edge Moor Iron Company, Edge Moor, Del., has recently distributed a neat booklet entitled, "Which Boiler Is Best for the Paper Mill?"

Belt Record Cards

It may not be generally known that any paper mill superintendent can secure a free supply of belt record cards from any of the prominent manufacturers of leather belting. The question of keeping belt record cards is not by any means a new suggestion, but in the paper mill, especially, these records should always be kept as they assist so greatly in enabling the belt buyer to purchase belting that gives him more production—and at less cost.

Transmission belting has so much to do with production efficiency that every superintendent should have a recorded



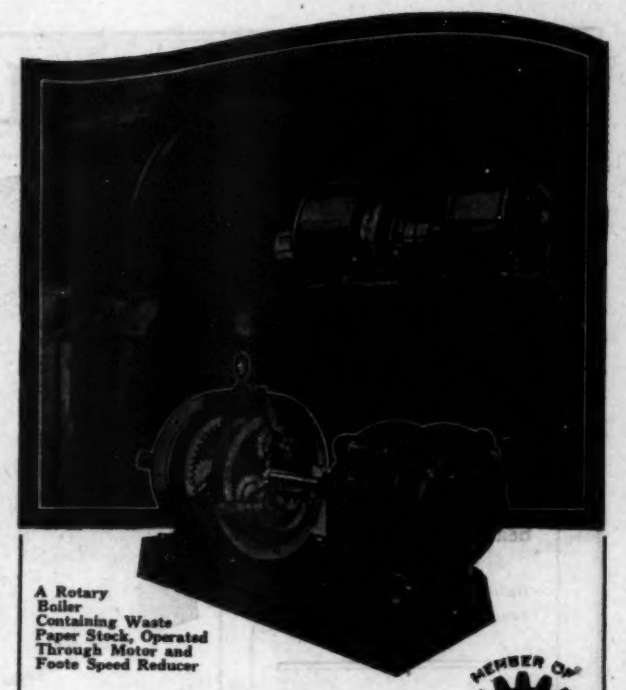
The card reproduced here shows the front and back of the belt record card. These cards are 8" x 5" in size. The lower part of the above is the front of the card—the upper part the back. A supply of these cards can be obtained without charge from the Chicago Belting Company, with the name of the mill imprinted on them

Courtesy of Chicago Belting Company

knowledge of his experience in the services that can be expected of belts on his different classes of drives. It is not necessary for him to keep a card for every belt in his mill, but he should at least keep a record or two of every *class* of belt drives and should always keep records of his larger and more costly belt installations. Belt records should be kept of every beater, Jordan, calender, and other drives in the entire mill.

A great deal is now being said about belt tests and belt quality, but after all is said and done, actual service of the belt *on the pulleys* is the one and only final test. How long the belt lasts and how well it did its work will tell all there is to know about belting quality. High grade leather belts today are said to have an efficiency of between 98 and 99 per cent on any well designed drive.

It is estimated conservatively that with the intelligent use of these cards and some attention to the care of belts after they are installed, the average plant can reduce their belting costs 25 per cent.



A Rotary Boiler Containing Waste Paper Stock, Operated Through Motor and Foote Speed Reducer

MEMBER OF AGMA

FOOTE SPEED REDUCERS

"The Proof of the Pudding"

"The proof of the pudding is in the eating," goes that old saying, and the proof of the advantages of Foote Speed Reducers is in their use.

You will never fully appreciate their value —why they save maintenance and upkeep cost, and provide better working conditions until you try a Foote Speed Reducer.

Foote Speed Reducers are the ideal method for reducing the speed of motors operating storage tanks, mixers, conveyors, and other paper mill equipment.

Try one Foote Speed Reducer on one piece of your equipment. Then you will realize why they will lower your power transmission costs. Consult Foote Engineers.

Send for literature

FOOTE BROS. GEAR & MACHINE CO.

Manufacturers of Rawhide and Micarta. Pinions and Cut Gears of All Kinds. Send for Catalog. Special Machinery Made to Order. Submit Your Blueprints.

250-260 N. Curtis St. Chicago, Ill.

J. R. SHAYS, Jr., 100 Greenwich St., New York City.

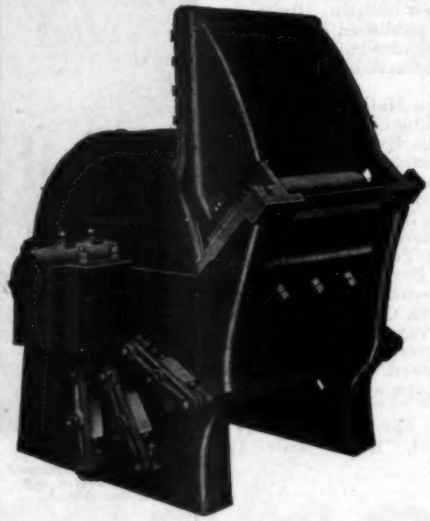
KING & KNIGHT, Underwood Bldg., San Francisco, Cal.

MITTS & MERRILL GRAVITY FEED SHREDDER

Reduces Paper Stock

Magazines, books, old paper and boxboard, frozen or dried pulp laps run through the Mitts & Merrill Gravity Feed Shredder are reduced to particles which hydrate readily when put into the beaters.

Built in six sizes with spouts ranging from 18" to 45" wide



Reduces Costs

Because shredding in the Mitts & Merrill Gravity Feed Shredder expedites hydration in the beaters there is considerable saving made in power. Thus we see that the shredder here illustrated reduces costs while it is reducing paper stock.

We will be glad to furnish details upon request.

We also build a 100% efficient "Hog" to reduce pulp mill bark and wood refuse

MITTS & MERRILL 1013 Tilden St. **SAGINAW, MICH.**

Two 600 Ton Southwark Pulp Presses. Part of a Battery of Six Southwark Machines Installed at the Backus-Brooks Co., Kenora, Ontario

HYDRAULIC PRESSES

FOR

PULP, SULPHITE AND BALING

Hydraulic Accumulators, Pumps, Valves, Fittings, Etc.

To plants which operate their own machine repair shops or which have an industrial railroad, we offer a large variety of hydraulic and power tools, such as punches, shears, bending rolls, riveters, etc., for sheet metal work; Hydraulic broaching and bushing presses for general machine repair; Wheel presses for railroad rolling stock, etc.

Southwark Foundry and Machine Company

PHILADELPHIA, PA.

Swetland Building CLEVELAND

Fisher Building CHICAGO

New England

Boston, July 2, 1923.

Poor Month for New England

Last month was a depressing one for the paper business of New England, excepting from such a description the newsprint mills which continue on a fully 90 to 100 per cent schedule. Various factors have combined to accentuate the general dullness of trade. Among them the most potent at this writing is the strike of operators in the exchanges of the New England Telephone and Telegraph Company, whose service covers all of New England except Connecticut. How dependent business has become on this institution is vividly brought out by the present conditions and while the company is maintaining some sort of service it is wholly inadequate outside of Boston proper.

An indicator of conditions is the price of raw materials. Coal has been very weak, casein is available under 20c, waste papers, rags and bagging have all declined to new low levels for the year and the most important buyer of rope in the country, whose headquarters are in Boston, has dropped his price to 5¼c compared to the season's high of 7½c per pound, which is a very material decline for such a stable commodity.

Boston Paper Trade Association Makes Merry

Members and guests of the Boston Paper Trade Association to the number of 150, the largest attendance in the history of the association, went to North Scituate Beach, Mass., on June 14 for their annual outing. The day was a success from every angle. The sports were staged at the Hatherly Golf Club and the dinner and meet was held at the Cliff Hotel fronting the shore. Among the sports, the prominent event was a fast ball game between manufacturers and merchants, and the paper mill men for the first time in about five years were the victors. They won by the comfortable margin of 16 to 9. George W. Wheelwright, Jr., 3rd baseman of the paper makers, played a fast game, and D. K. Brown of the Strathmore Paper Co., who captained and pitched for the mill men, was a star on the mound and at bat.

Other contests which furnished amusement to the non-competitors was the biscuit eating race, the object being the most rapid mastication of a piece of hard tack, the peanut golf contests played with a peanut and a small mashie and the bond guessing contest. The latter developed the paper experts among the crowd, for the object was to guess the price and the manufacturer, the bond being unwater-marked.

L. S. Willson, the new president and general manager of the American Writing Paper Company, was elected to membership as was R. S. Hibbard of the B. D. Rising Paper Company.

The Westfield River Paper Company of Russell, Mass., has been purchased by Karl Becker and associates, who announce that the concern will be reorganized financially and the mill enlarged. The company makes glassine papers and will soon begin production of a special line of these papers. A strong organization is seen in the names of those already mentioned. Alfred A. Chapin, president of the Moore Drop Forging Company of Springfield, Mass., will be president. Mr. Chapin as president of the company that is one of the largest suppliers of drop forgings to the Ford Motor Company, naturally is well known in New England business circles and success is predicted for the new concern on the basis of his connection. The first vice-president is Karl Becker of the Becker Paper Corporation of New York City, which insures practical paper men in the organization. Folke Becker, present mill manager of the plant, is second vice-president. Mr. Chapin is treasurer as well as president. A new line of waterproof paper, which it is declared has exceptional quality, will be started this month, although the old lines sold under the trade name of "Waterglass" will be continued.

A decision of the Interstate Commerce Commission reversed one previously issued concerning the assessment of demurrage on pulpwood, coal and other materials at the plant of the International Paper Company at Wilder, Vt. It appears that a certain number of loaded cars were placed by the Boston & Maine railroad, "constructively placed" is the expression used, near the paper company's property and awaiting further instructions as to delivery. The road did not inform the consignee in writing of the placement of the cars as required in the rules but claims that the company had knowledge of the fact through verbal notice given an employee of the mill. The company claims demurrage could not be assessed because the rules had not been completely complied with, but the commission on the contrary refuses this as reason for not unloading the cars, holding that verbal notice was sufficient. It is inter-

Paper Machinery and Equipment

at

Old Hickory Powder Plant now released *for* immediate disposal

20 Mammoth Jr. Jordan Engines. Maker Noble & Wood Co. Shell 5 ft. 6 in. long, with 10-in. inlet and 6-in. outlet. Capacity, 30 tons per 24 hours. Will run either direction at 350-375 R. P. M. Fitted with steel bar knives, block and oak fillers.

39 Welded Steel Digesters. Maker, Continental Iron Works. Capacity, 1300 cu. ft. Inside diameter, 8 ft. Length, overall, 27 ft. Working pressure, 110 lbs. per sq. in. Tested 165 lbs. per sq. in. Each digester complete with cast iron supporting ring, cast iron false bottom, hoppers, guides, and all accessories.

1000 Steel Tanks, capacities, 100 to 55,000 gallons.

□ □ □ □

Send for Tank Bulletin No. 7 and Chemical Bulletin No. 14

□ □ □ □

Let us submit complete specifications and quote prices that will save you money

□ □ □ □

Nashville Industrial Corporation

Jacksonville, Tennessee

SCREEN PLATES *and* **DANDY ROLLS**

Watermarking a Specialty

Central Manufacturing Co.

The Quick Service House

KALAMAZOO MICHIGAN

UNION SCREEN PLATE CO.

Fitchburg, Mass., U. S. A. Lennoxville, P. Q., Canada

UNION BRONZE SCREEN PLATES

(Best phosphorized Cast Metal)

Old Plates RECLOSED and RECUT to accurate gauge
UNION BRONZE SCREWS for Screen Plates
Immediate Delivery of the Largest Orders. Satisfaction Guaranteed

The Witham Screen Plate Fastener, Patented

THE ORIGINAL THE BEST

Remember

WM. A. HARDY & SONS

FITCHBURG, MASS.

Originators and Oldest Manufacturers

OF THE

Cast Bronze Screen Plate

ALSO SPECIALIZE IN

Acid Resisting Digester Parts

PERFORATED METAL SCREENS

in all metals for pulp and paper mills
Elevator Buckets (Plain and Perforated)
Conveyor Flights and Trough
General Sheet and Light Structural Work
Light and Heavy Steel Plate Construction
Write for perforated metal handbook

HENDRICK MFG. COMPANY

Main Office and Works, 51 Dundaff Street, Carbondale, Penna. 30 Church Street, New York City 344 Union Trust Building, Pittsburgh, Penna.

LOCKPORT, N. Y. NIAGARA FALLS, ONT.

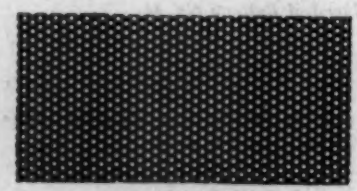
F. W. ROBERTS MANUFACTURING CO.

All Products Guaranteed to Suit You

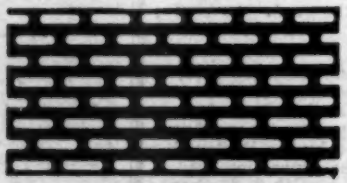
STEEL SHELL BURRS YELLOW JACKET SHOWER

Read the "ROBERTS IDEA"

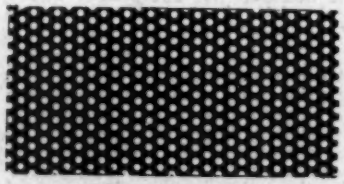
Perforated Metal Screens for Pulp and Paper Mills



.065 inch round



⅛ x ⅝" Slots



3/32 inch round

Steel, Copper, Brass, Bronze and other alloys punched for Centrifugal and Rotary Screens, Pulp Washers, Drainer Bottoms, Filter Plates, etc.

CHARLES MUNDT & SONS 57-65 Fairmount Avenue, Jersey City, N. J.

esting as showing that strict application of the I. C. C.'s own rulings cannot always be expected.

A paper rate case of more than usual importance in that it was concerned with the international rates on pulpwood from Daaguam, Quebec, to East Ryegate, Vt., has been decided apparently in favor of the paper company according to a report of the examiner who heard the case in Boston last spring. Report was rendered last month to the Interstate Commerce Commission which will shortly issue its findings. The Boston & Maine railroad assessed charges on pulpwood from Daaquam, to East Ryegate at 25c per hundred pounds, compared to a rate of 21½c in effect to Groveton, N. H., which was farther over the lines of the B. & M. than East Ryegate. Consequently it was claimed that the long and short haul section was violated and it appears that reparations will be awarded on this basis. Involving as it does an international rate, the decision asserts the commission's authority over rates when they are prejudicial to Americans, even though part of the tariff is collected for a haul in Canada.

The chemistry department of the University of Maine is conducting a summer school course in pulp and paper chemistry and technology. The University of Maine was the first institution in the country to offer courses in pulp and paper, and the success of its graduates is an excellent measure of the value of the school. Graduates occupy positions as heads of research departments, superintendents, chemists and managers. The work given at the summer school is designed to meet the specific needs of students who desire and are qualified to take pulp and paper courses and also for pulp and paper mill men with or without technical training who have had practical experience and who desire to gain a scientific knowledge of important phases of the industry. Three courses are offered in pulp making and three in paper making and the courses are arranged so part pulp and part paper making may be studied.

J. A. & W. Bird & Co., among the largest dealers in the country in casein, satin white and other paper makers' chemicals and owners of the Flintkote roofing, have incorporated their business which has existed as a partnership for over 85 years. The purpose of the corporation was to admit into the business Messrs. John B. A. Regnier and Adrien E. Regnier, father and son, who become vice-president and treasurer of the company respectively. One thousand shares of common stock and two thousand of preferred were issued, having a total value of $200,000. Mr. Reginald W. Bird retains control of the company, which has been a partnership within the Bird family for the entire period of its existence.

Foundation is already about completed for a new foundry at the plant of Rice, Barton & Fales, 65 Taintor St., Worcester, Mass. The company is one of the most important manufacturers of paper mill machinery in New England and has under construction several huge Fourdriniers, among them a big kraft machine for the Southern Paper Company and a big book paper machine for the Oxford Paper Company. Their business has been exceptionally good this year and the new construction became imperative. The structure will be of brick and steel, one story, 140 by 36 feet. The contractors are E. J. Cross & Co. of Worcester.

The Vermont Power and Paper Company has been chartered in Massachusetts with capital stock authorized at $250,000. The incorporators include A. A. Fredericks, manager of the John A. DeVito Company of Boston, one of the largest paper stock houses in New England; G. O. Dudley of the Sears, Roebuck Company, and several North Adams, Mass., men. A board mill for converting waste paper into bogus, chip board, and other products will be built at Pounalli, Vt. It is expected that 25 tons per day will be the capacity at the start. An experienced paper maker has been retained.

Brown & Co. are to solve the question of disposing of their pure hydrogen gas, a by-product of sulphite manufacture, by combining the gas with peanut oil to form a high grade cooking fat which they will distribute throughout the country through national agencies. To supply themselves with enough peanut oil they have taken steps to acquire 60,000 acres of lands in the Everglades of Florida where they will grow the peanuts and establish mills to extract the oil. Being the largest sulphite makers on the continent this company has large amounts of hydrogen.

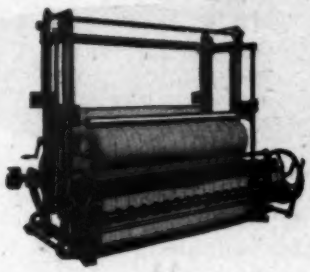
The National Association of Purchasing Agents will hold its annual convention in Boston next May. There will be group meetings among them, one on paper, which will further

IF YOU are not getting results from your SULPHITE SCREENINGS, or if some of this material is wasted, you ought to let us show you what can be done with

Claflin Continuous Beaters

Manufactured by

THE HERMANN MANUFACTURING CO.
LANCASTER, OHIO



"Shear Cut" Slitting and Rewinding Machines

Adj. Rotary Spot Sheet Cutters with Lay-boy cut to register and jog square.

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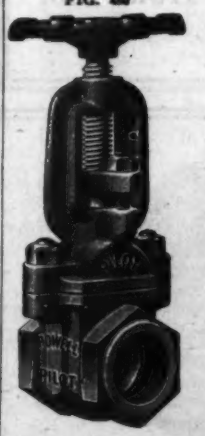
Iron Body or All Iron

"Pilot" Gate Valves

WITH OUTSIDE SCREW STEM AND YOKE

FIG. 400



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Working Pressure Up to 125 Pounds

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CINCINNATI, OHIO

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SOLVED

SACOLITE MILL WHITE

PYRAKOTE PAINT

PAINTS FOR PAPER AND PULP MILLS

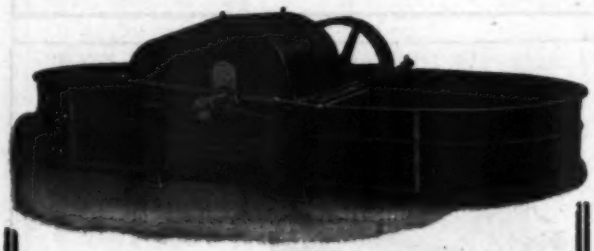
See Paper and Pulp Mill Catalogue

Explain your troubles to

STEWART-ADAMS & CO.

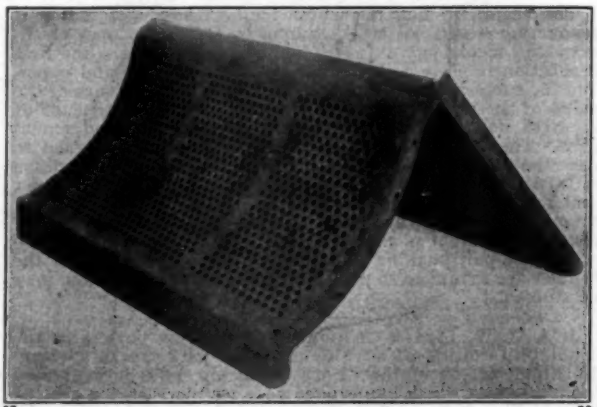
430 NOBLE STREET
CHICAGO

PAPER AND PULP MILL PAINT SPECIALISTS



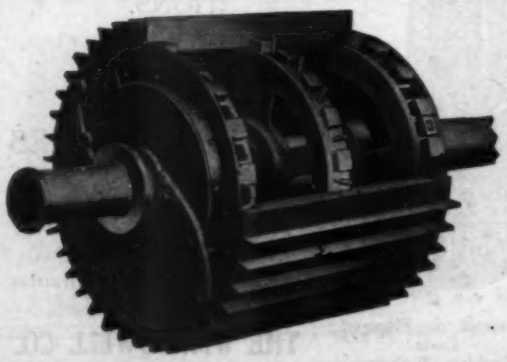
"Dayton" Beating Engines are Built for Heavy Duty

Dayton Beater and Hoist Co.
DAYTON, OHIO



Because there are no moving parts this is a very simple but very efficient device. Patent No. 1,271,426 issued to Mr. Brownell Buehler, July 2nd, 1918.

The Shartle Continuous Beater Company
MIDDLETOWN, OHIO



Dayton Globe Iron Works
DAYTON, O.

We manufacture Beating and Washing Engines, Head Gates, Hoists and Gears.

Our Wedge Type Bandless Roll made of semi-steel with special alloy bars is practically indestructible.

endeavor to standardize sizes, weights and colors. This association claims credit for reducing 1,428 sizes of paper to nine. A. V. Howland of the Tileston Hollingsworth Company, paper makers of Hyde Park, Boston, will take general charge of the convention. Mr. Howland is purchasing agent and general manager of his company.

Leon M. Yoerg, for many years with the Carew Manufacturing Company of South Hadley Falls, Mass., has become manager of production at the American Writing Paper Company of Holyoke, Mass. William N. Nixon, formerly production manager of the Chemical Paper Manufacturing Company, takes the same position in the board and tissue mills of the American Writing Paper Company. Both are now "on the job" with the American though their appointment was announced some time ago.

Hardly a month after floods had caused heavy losses of pulpwood in northern New England forest fires became a menace. Paper companies with large holdings in Maine were among the chief sufferers.

Wilson Jones Loose Leaf Company of Boston, largest manufacturer of loose leaf paper products, has chartered a separate organization in Illinois to take care of the middle western trade.

It is reported that the Technical Association of the Paper and Pulp Industry will hold their annual Fall meeting in Appleton, Wis., on October 25 and 26, 1923, in conjunction with the Northwestern Division of the American Pulp and Paper Mill Superintendents' Association and the Wisconsin Division of the Cost Association of the Paper Industry.

Miami Valley

Piqua, O., July 2, 1923.

Miami Superintendents Meet

One of the most successful and enjoyable meetings of the Miami Valley Paper Mill Superintendents' Association held for several years was the session conducted at the plant of the Orr Felt and Blanket Company on Friday, June 29. More than one hundred members of the association and their families attended the meeting.

The business session was held in the cafeteria of the plant and details of the manufacture of paper felts were discussed at length. General market conditions were also discussed by members who practically all gave their opinions on conditions in their business as well as business in general.

The optimistic view of general business prosperity indicated that practically everyone views the future with confidence.

Mr. G. Burrell, vice president and general manager of the Orr Company, welcomed the guests, and he made a brief address telling briefly of the manufacture of paper makers' felts. He was followed by William U. Hanke, superintendent of the plant who went into technical details of the manufacture, tracing the entire process and illustrating it from the time the raw felt is received until the finished product is turned out. Samples were exhibited and the superintendents were permitted to retain a number of these for future reference.

At the close of the business session the visitors were escorted over the plant, which occupies several acres, and later a dinner was tendered the visitors in the cafeteria.

Personals

Announcement has been made of the resignation of Leo W. Bowmall as vice president and treasurer of the American Woodpulp Corporation, of 347 Madison Avenue, New York. Mr. Bowmall is leaving the pulp trade, after having been identified with it a great many years, to enter another line of business. Until recently Mr. Bowmall was secretary of the Association of American Wood Pulp Importers and in this capacity did much toward assisting in opposing the proposed duty on wood pulp as well as the anti-dumping measure. The business of the corporation will be continued as heretofore under the direction of James Rosenberg as president, while Kenyon Harris continues as secretary.

Dr. W. T. Read, professor of chemistry at Yale University, was elected a member of the Advisory Committee of the Chemical Exposition at the meeting and will take charge of the program for practical courses in chemistry and chemical engineering to be given in conjunction with the 1923 Exposition for college students. Dr. Read is a professor of industrial chemistry and will plan the student courses which will last throughout the week of the Exposition, to meet the actual operating problems of the industry. Leading authorities in their respective fields will give the lectures.

Quality Guaranteed

The Smallwood-Low Stone Co.
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Stevens Tank and Tower Co.
9-23 Center St. - - - - - Auburn, Maine

Wooden Tanks, Tubs, and Vats

Wooden Penstocks, Acid Towers, etc.

Inbuilt strength and durability are features of all products manufactured by this company. Handy pocket size catalog mailed upon request.

Established 1883

A. D. COOK, Inc.
Lawrenceburg Indiana

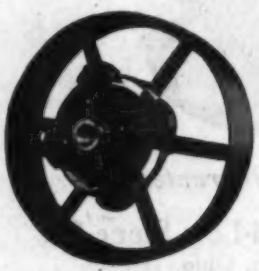
FIG. NO. 30

Manufacturers of Deep Well Pumps, Working Barrels, Rods, Foot Valves, Strainers and a full line of Water Well Supplies.

The accompanying half tone shows the COOK Patent Brass Tube Well Strainer with Standard Fittings, which are Bail Plug in the bottom and Foot of Blank and Lead Packer on top.

When the COOK Strainer is properly selected for the water bearing sand, capacity and method of pumping, it will successfully deliver the maximum yield of the well for many years free from sand and the troubles incident thereto.

Write for Bulletin 30A



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A complete line of

Power Transmission Machinery

FOR

BELT AND ROPE DRIVES

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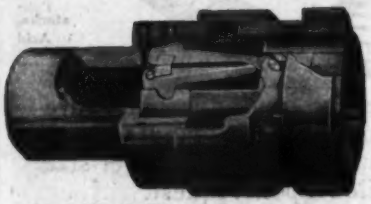
Catalogues upon request

THE JOHNSON FRICTION CLUTCH



Single Clutch Showing Working Parts

Is the Smallest and Most Compact Clutch

IT IS VERY POWERFUL FOR ITS SIZE

NOTE CONSTRUCTION—THE SLEEVE CARRIES A CURVE-SHAPED WEDGE WHICH SPREADS THE LEVERS WHEN SLEEVE IS MOVED FORWARD AND THE LEVERS BEING FULCRUMED IN THE RING, EXPANDS THE RING INSIDE THE CUP. THE FRICTIONAL CONTACT DRIVES THE CUP ON THE HUB OF WHICH CAN BE MOUNTED STANDARD STEEL SPLIT PULLEYS, CONE PULLEYS OR SOLID IRON PULLEYS FOR SHAFTING DRIVES. FOR SHORT CENTER DRIVES, SPROCKETS ARE USED.

WHEN INSTALLED ON MACHINERY GEARS ARE MORE OFTEN MOUNTED ON HUB.

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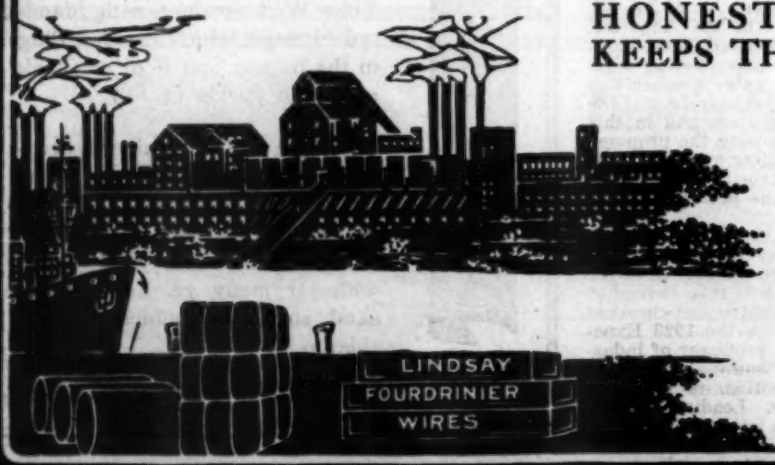
THE CARLYLE JOHNSON MACHINE CO. MANCHESTER CONN

Real Merit Placed

Lindsay Fourdrinier Wires

In Many Mills



HONEST SERVICE KEEPS THEM THERE

They are ready to serve you

The Lindsay Wire Weaving Company

Collinwood Sta., Cleveland, Ohio

"Ask any Papermaker"

Mr. C. H. Roessner has been appointed district sales manager for the Foxboro Co., Inc., manufacturers of high grade recording and indicating instruments, Foxboro, Mass. He will have his central offices at 1510 Monadnock Bldg., Chicago, Ill. Mr. A. F. Mundy, formerly of the Chicago office, will represent the company in southern California, with offices at Pacific Finance Bldg., Los Angeles, Cal.

I. S. Reynolds has resigned as vice president and general sales manager of Coy, Hunt & Company, paper merchants of New York, which position he assumed on July 1 last year, and is continuing in the paper business on his own behalf with offices at 15 East Fortieth Street, New York. Mr. Reynolds is widely known in the industry. He entered the paper trade in 1902 with one of the largest fine paper houses in Chicago, and in 1908 he opened the Chicago sales offices for the mills now known as the Nekoosa-Edwards Paper Company.

R. J. Smith, general agent for the Southern Pacific railroads, announces that a new reduction is to go into effect on several items of transcontinental west bound freight. Among these items are binder and box board, building paper, indented or corrugated paper, roofing felt, straw board, wood pulp board and wall board. These will receive approximately 15 per cent reduction on all shipments east of the Indiana-Illinois state line and the Mississippi river.

J. J. Patricof has resigned as president and director of the Waste Material Trading Corporation, importers of papermaking materials of 135 Broadway, New York, and has disposed of his interests in that corporation. Mr. Patricof has not yet announced his plans for the future but states that he will remain in the paper stock trade. William Wacht was elected president of the corporation to succeed Mr. Patricof.

Robert B. Beatty, of the Whiting-Patterson Paper Company, paper merchants of New York City, was married on June 18 to Miss Helen McLeod, of Montclair, N. J. Mr. Beatty is a son of George W. Beatty, of Wilkinson Bros. & Company, paper dealers of New York, and a brother of Howard Beatty, of the American Writing Paper Company in Philadelphia.

C. C. Burns, general manager of the St. Regis Paper Company, of Watertown, N. Y., has returned to his home after a year spent in a Chicago sanitarium undergoing treatment for a serious stomach ailment. Mr. Burns has not yet sufficiently recovered to assume his duties at the St. Regis mill, but will spend the summer at his home at Star Lake.

Mr. George J. Cadwell has been appointed sales manager of the American Writing Paper Company to succeed Mr. Carl E. Lincoln, resigned. Mr. Cadwell for the past several years has been assistant sales manager of the Eagle-A organization and previous to then was connected with the Chicago office of the big paper-making organization.

Herman W. Ahrens, formerly with the E. J. Keller Company, Inc., of New York, and more recently with the Emanuel Salomon Corporation, also of New York, is now connected with the Stone Bros. & Victor Galaup Company, of 155 Spring Street, New York, importers of and dealers in papermaking rags.

Victor A. Seuberth, who has been very prominently connected with the sale of leather belting for the last eighteen years, has now joined the Chicago sales organization of the Chicago Belting Company as assistant to Mr. A. J. Weis, general sales manager.

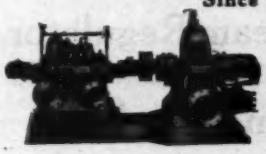
Mr. J. C. Bloomfield, who for a number of years was with C. H. Hart & Co., Chicago contractors, has now taken charge of the Industrial Works' Chicago office at 1051 McCormick Bldg., handling the sale of Industrial equipment in that territory.

Carl A. Lincoln, who for the past few years has been general sales manager of the American Writing Paper Company resigned that position on June 22. George Cadwell, who has been assistant sales manager will be Mr. Lincoln's successor.

Mr. Fred A. Lehy, vice-president of the Eastern Mfg. Co., sailed on the Leviathan, July 4, for a six weeks' pleasure trip in London and Paris.

George Krueger, for the past 36 years connected with Henry Lindenmeyr & Sons, paper merchants of 32 Bleecker Street,

MIDWEST TURBINES AND PUMPS
Since 1889



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Centrifugal pumps, reciprocating pumps and steam turbines.
Complete turbo-pump, generator and fan units.

PUMPS and TURBINES FOR EVERY SERVICE
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CRESCENT BELT FASTENERS
They Insure Full Power Transmission
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They Make Good Belts give Better Service
CRESCENT BELT FASTENER CO.
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Aurora Centrifugal Pumps

Type OMD

Aurora pumps are made in many types, to meet all conditions found in the paper mill field.

We specialize in horizontally and vertically split open and inclosed impeller, single and multi-stage and deep well turbine centrifugal pumps as well as deep well reciprocating pumps.

A card from you stating your conditions places our engineers at your service and results in a saving to you.

AURORA PUMP & MFG. CO.
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Pickles' Patent
Automatic Steam Regulator
FOR
Paper Making Machines

Which absolutely control the drying of the sheet. Installed on sixty days' trial

W. F. PICKLES **Buckland, Conn.**

Ticonderoga Machine Works
TICONDEROGA, N. Y., U. S. A.
MANUFACTURERS OF
WARREN IMPROVED CALENDER DOCTORS
With Flexible Blades, Universal Adjustment and Control
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WARREN IMPROVED PATENT DOUBLE DRUM WINDERS
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Stock Circulating Systems *and*
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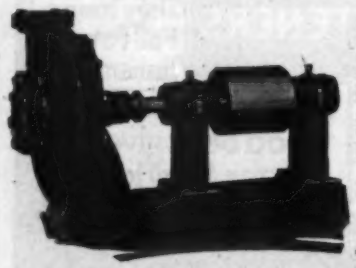
SEND FOR OUR BULLETIN

QUALITY



Quality is built right into every part of every Taber Pump. The result is the best pump it is humanly possible to make; one that always gives satisfactory service.

Submit your pumping problems to us

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"Pump Specialists"

Builders of Centrifugal and Rotary Pumps

PUMPS
INDUSTRIAL—AGRICULTURAL—MUNICIPAL—RESIDENTIAL
A Type for Every Service
THE GOULDS MANUFACTURING COMPANY
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NORTHERN CRANES AND HOISTS
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Steel Plate Construction
Steel Storage Tanks, Blast Furnaces, Gas Holders
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Steel Transmission Towers
RITER-CONLEY COMPANY
General Offices, Pittsburgh, Pa.

FOSTER SUPERHEATERS
A necessity for turbine protection, engine cylinder economy and utilization of superheat for all its benefits
POWER SPECIALTY COMPANY Boston, Philadelphia, Pittsburgh, Kansas City, Chicago, San Francisco, Dallas, London, Eng. 111 Broadway, NEW YORK

"The Chain of Double Life"

Why Double Life?

When the pins and bushings in Union Steel Chains are considerably worn on the one side they can be turned half a revolution, thus bringing their unworn sides into service and practically renewing the chain; later they can be replaced with new wearing parts at small expense. Union Steel Chains invariably give longer service per dollar of cost; that's why they are used by the leaders in all industries.

UNION STEEL SPROCKET CHAINS
The chains with the substantial links and large case-hardened bearings. All sizes and capacities from one-inch pitch to 1,000,000 pounds ultimate strength.
Roller Chains; Bushing Chains; Elevator Chains; Conveyor Chains; Barking Drum Chains; Monel Metal Chains and Elevator Buckets; Cast Tooth Sprockets; Cut Tooth Sprockets; Renewable Tooth Sprockets; Elevating and Conveying Machinery
THE UNION CHAIN & MANUFACTURING COMPANY SANDUSKY, OHIO, U. S. A.
Registered UNION Trade Mark

New York, is now a member of the sales staff of the Pohlman Paper Company, of New York.

William C. Frye, for seven years president of the Chain Belt Company, Milwaukee, has retired from active participation in its affairs and has been succeeded by C. R. Messinger, vice president and general manager since 1917.

Mr. Stewart E. Seaman has resigned his position with The Procter & Gamble Distributing Co., Cincinnati. Mr. Seaman, who has had charge of pulp sales for that company, will be succeeded by Mr. W. P. Richardson.

On July first, Frederick A. Curtis, formerly head of the Bureau of Standards, Department of Commerce, Washington, D. C., will become connected with the American Writing Paper Company.

J. D. Beaty, formerly superintendent of the Vulcanite Roofing Company, Anderson, Ind., has been engaged as superintendent of the Pioneer Paper Company, Los Angeles, Calif.

George E. Miller has joined the organization of the Carthage Sulphite Pulp and Paper Company, Carthage, N. Y. He will take charge of the company's sulphite mill.

Obituary

Leslie W. May

Leslie W. May, treasurer of George W. Millar & Company, Inc., paper merchants of 284 Lafayette Street, New York City, died at his home in Bronxville, N. Y., on June 10 after a lengthy illness. Mr. May was 43 years old and was well known in paper circles, having been connected with the Millar firm for 25 years. In March, 1900, William D. May, Sr., William D. May, Jr., and Leslie W. May bought out the interest of George W. Millar and continued the partnership until the business was incorporated in 1919, at which time Leslie W. May became treasurer of George W. Millar & Company, Inc.

Northern New York Superintendents Meet

The spring meeting of the Northern New York Division of the American Pulp and Paper Mill Superintendents' Association was held at Watertown, N. Y., June 21.

The business of the afternoon started with the election of officers, who are as follows:

Chairman, Homer J. Stafford (re-elected), Knowlton Bros.

Vice-chairman, William Brydgers, Defiance Paper Co.

Secretary and Treasurer, William G. Argy (re-elected), St. Regis Paper Co.

Walter J. Rooney of the Albany Felt Company gave his illustrated talk on the manufacture of felts, which he has now given before practically every division of paper mill superintendents in this country. This talk will be found elsewhere in this issue.

The evening was made profitable as well as very enjoyable by many speakers of prominence in the industry, among whom were John H. O'Connell, past national president of the superintendents' association; George W. Sisson, Jr., president of the Racquette River Paper Co.; Mayor Robert E. Cahill; Ralph S. Baker, president of the Chamber of Commerce, and a good many others.

Our Mistake

In our account of the annual meeting of the paper mill superintendents, which appeared in our June issue we mentioned Edward F. Sheahan, as one of the members of the American Pulp and Paper Mill Superintendents Association who had died during the past year. We have since been informed, however, that Edward F. Sheahan is still superintendent of the Manistique Pulp and Paper Company, Manistique, Mich., and is in good health.

The Mr. Sheahan who died was a brother in Portland, Oregon.

We have just learned through its president, Mr. Joseph H. McCormick, that the American Paper Mills Corporation, of New York City, has formulated a connection with the Butler Paper Corporations of Chicago, New York and San Francisco. Detailed announcement to the trade will soon be made.

A fire of unknown origin in the sulphite mill of the Carthage Sulphite Pulp and Paper Company, Carthage, N. Y., on the morning of June 26 did damage to the approximated extent of $200,000.

AN EXPERIENCED paper salesman now employed, but desiring to enlarge his field of activities, is open for engagement. Thoroughly experienced in both fine and coarse grades of paper. Thoroughly familiar with and widely acquainted with the jobbing, converting and large consuming trade. Any organization desiring a man with ability, efficiency and initiative would do well to communicate. Address Box 55, Paper Industry.

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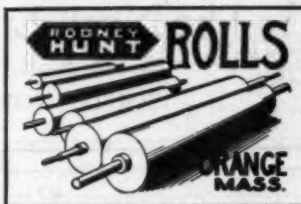

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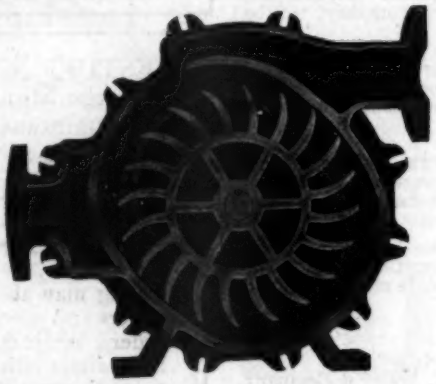

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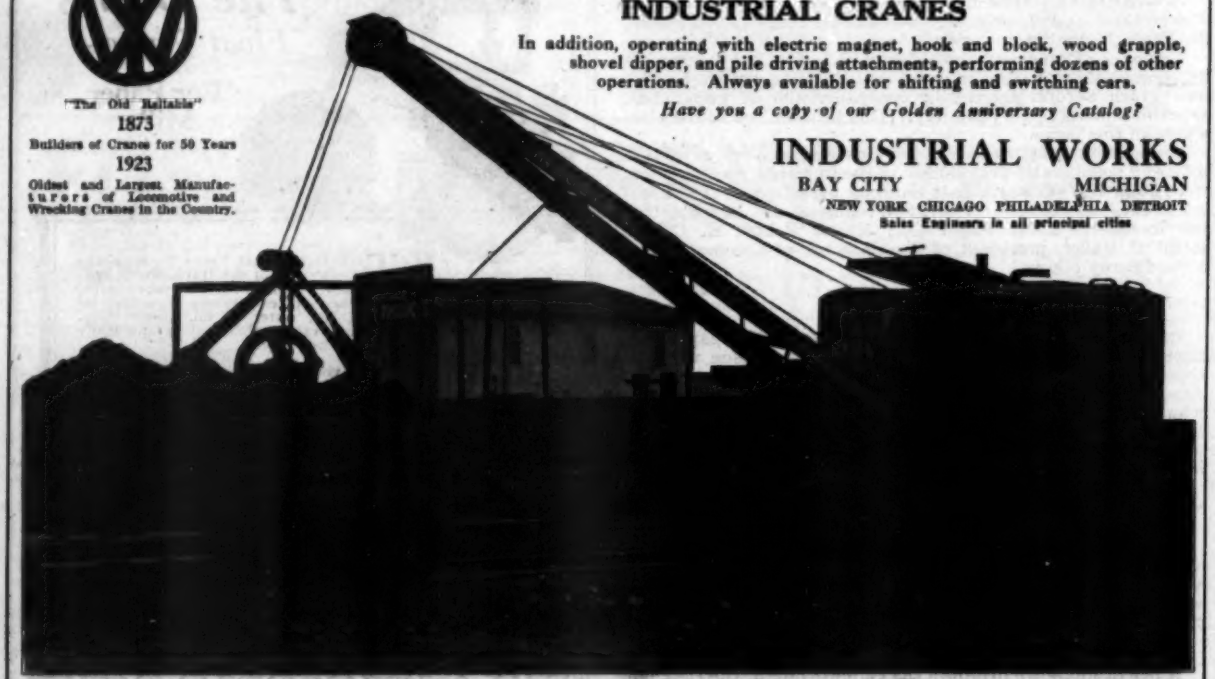

Foreign Correspondence

Present State of the Paper Industry in Germany

Since many paper mills here are operated by waterpower and water was abundant in spring and early summer, the question of motive power was at least no source of worry to many German manufacturers. Those using coal as fuel obtained it only at tremendous cost and in insufficient quantities since Germany lost the valuable Sarre region, the most valuable part of Upper Silesia and the very life blood of its coal supply—the Ruhr mines by the French invasion. Strange as it is, the nation which before the war exported considerable masses of coal is now forced to import whole shiploads from England and elsewhere. While the prices for the upkeep of livelihood are now in the middle of the year, 3,500 times as high as in 1914, coal is 10 to 12,000 times as dear. It affects, of course, the manufacturing costs of everything.

The prices for wood were raising the past six months with the exception of a month after Easter when the value of the Mark rose and kept steady for 6 weeks. Generally they are very high and the government has at last fixed maximum prices, in many cases having been urged by numerous petitions. Although the country is rather rich in forests Germany had to import some wood even before the war, while now since immense forest districts were lost to Poland and France they are forced to import still larger amounts and at tremendous costs. Many manufacturers were not able to find capital for the raw material. Rags and other waste material are extremely costly, the prices have far exceeded those on the world's market. Yet the quality is not pleasing.

The condition of pulp manufacturing has not been favorable. The demand for it has much decreased so that several mills work with half power, and in the case of waterpower they could not be fully utilized, others are entirely down. There exists no stimulation for importing pulp, considering the inland price level. Exports of cellulose were much handicapped by the high export taxes and the unfavorable treating of German paper goods by certain foreign nations. The French invasion has brought the paper and cardboard industry in the Ruhr and Rhine zones to a standstill. In the unoccupied Germany, the improvement and stabilizing of the Mark at least for several weeks caused a sudden stoppage of the inland and foreign business and thus remarkable restrictions of manufacture, in some cases shutting of factories ensued. Prices were much above the international ones for any kind of paper and paper goods owing to the enormous manufacturing expenses. This has for many months impeded exportation. Only when in the middle of May the German Mark made such a deep fall, orders came in from abroad in expectation of still rising prices, which indeed was the cause.

In these days the chamber of commerce of Plauen, one of the centres of the Saxon industry, has issued its annual report dealing with the past year which can apply to practically the whole of the empire. It is mentioned there that one of the greatest sorrows is the procuring of wood, for the reasons stated above, also because our chief provider before the war, Russia, is practically non-existing on account of the totally interrupted traffic. On the other hand wood from Poland and Czechoslovakia is extremely costly owing to the exchange rate. The inland wood auctions were much frequented and prices were offered which seemed fantastic. Thus, of course, the price of pulp, cellulose and paper followed the wild chase upwards and went beyond the level of the world market price. The latter is due also to constantly rising wages, freight and other expenses. Economy was and is being exercised in the use of paper as never experienced.

Daily papers, magazines, trade journals were and are compelled to raise their fees practically every month, subscriptions are not accepted for longer than a month, weeklies appear semi-monthly or become monthlies, size or the number of pages are reduced. As constantly advertisers and readers become less, many papers (about 10,000 last year) cease to appear, among them are such which are 50 and even 75 years old. Daily papers are now seldom read by a single family, but mostly two or three neighbors subscribe to one single copy to put the burden of the large subscription price on several shoulders.

The prices on printing paper for the press are fixed by the government which, favoring the consumer, tries to keep them down and is constantly quarreling with the manufacturers who try to prove that they cannot exist with such prices. The consequence is that the latter raises the prices for other kinds of paper not under government control. This circumstance together with the constantly rising postage charges, induces individuals and firms to apply utmost economy in their correspondence. While postage went up in the past year 10 to 30 per cent, a sudden jump of 100 per cent took place last Easter, while now in July this year a never

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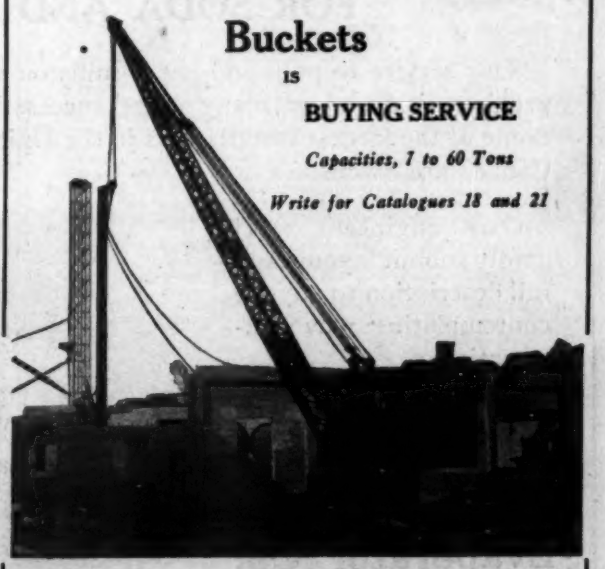

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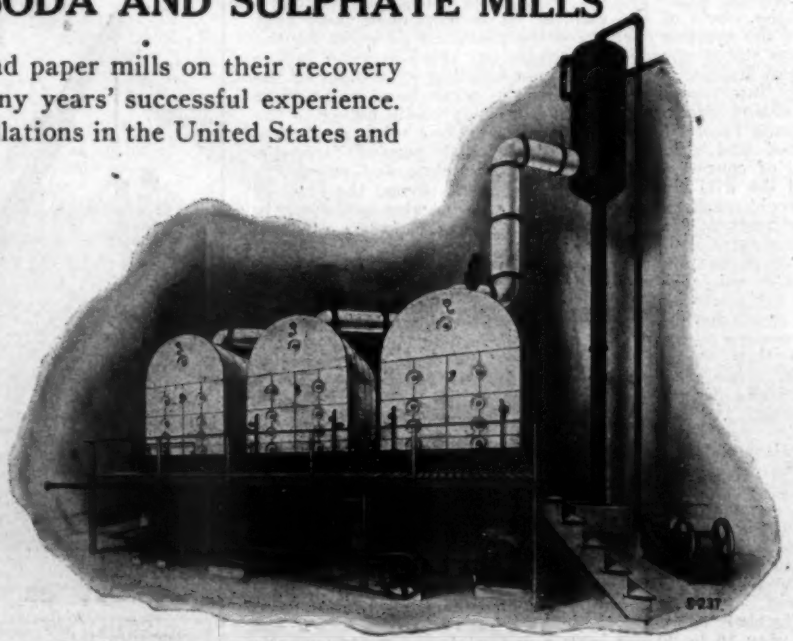

Standard Swenson Horizontal Tube, Triple Effect

experienced jump takes place as high as 400 per cent. Now an ordinary letter which in 1914 had cost 10 Pfg. or 1/10 of a Mark or a penny is to be prepaid with 400 Marks, that is 4,000 times as much. Business gradually is coming to the place where they do not give a reply unless the enquiring party pays the return postage or gives an order.

The wonderfully flourishing industry of pictorial postcards in which Germany surpassed any other country, both as regards manufacturers and as a sport of collecting, has received now a deadly blow for these reasons. To send out congratulatory cards on holidays has become quite rare.

The Paper Trade in Austria

It is only recently that there are signs of improvement. The most dangerous feature of a business stagnation, the scarcity of capital, has affected quite a large number of paper firms. Many were forced to sell their stock for a lump sum to save their existence and to get fresh capital, others collapsed. During the past six months the Austrian paper mills were quite busy, especially for export, only the inland business is not satisfactory. The whole situation depends much on that in Germany, which has become a less dangerous competitor, since nearly all paper mills in the Rhine and Ruhr zone have closed. On the other hand, during June the exchange rate of the German Mark went below the level of the Austrian Krone, a thing never experienced since the war, and this, of course, favors the German export, spoiling the Austrian foreign trade. How, therefore, the latter will develop for the coming season, depends rather on the stand of the Austrian money and solving of the important problem along the Ruhr and Rhine.

A good business is made with the famous port Trieste, once the only Austrian seaport. The main business there is in the hands of the official representative of the Austrian paper industry. Gradually the old Italian paper mills supply the market since the end of 1921. By their competition, the price has sunk 20 per cent. The Italian paper makers endeavor to eliminate foreign competition entirely; for that purpose they accept orders demanding cash after only three months, which the makers in countries with a low money standard are unable to do. Besides the Italian custom tariff of July, 1921, very much favors the domestic manufacturers. The tax is 12 to 15 gold Lira per 100 kg. France need pay only 50 per cent of the tax, according to the recent agreement.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912,

Of The Paper Industry, published monthly at Chicago, Illinois, for April, 1923.

State of Illinois, County of Cook—ss.

Before me, a Notary Public in and for the State and county aforesaid, personally appeared Edward B. Fritz, who, having been duly sworn according to law, deposes and says that he is the Owner and Publisher of The Paper Industry, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, Edward B. Fritz, 356 Monadnock Bldg.; Editor, A. Scott Dowd, 356 Monadnock Bldg.; Managing Editor, A. Scott Dowd, 356 Monadnock Bldg.; Business Manager, Edward B. Fritz, 356 Monadnock Bldg.

2. That the owners are: (Give names and addresses of individual owners, or, if a corporation, give its name and the names and addresses of stockholders owning or holding 1 per cent or more of the total amount of stock.) Edward B. Fritz, 356 Monadnock Bldg.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

5. That the average number of copies of each issue of this publication sold or distributed through the mails or otherwise, to paid subscribers during the six months preceding the date shown above is..... (This information is required from daily publications only.)

EDWARD B. FRITZ,

(Signature of editor, publisher, business manager, or owner.)

Sworn to and subscribed before me this 22nd day of March, 1923.

(SEAL) MARY F. ALLEN, Notary Public.

(My commission expires March 20, 1926.)

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New York, June 2, 1923.

IT IS evident at every hand that demand for some kinds of paper has subsided to a pronounced degree. This, however, is a seasonal condition which invariably develops at this time of the year, and the fact that the market, in its entirety, is quieter has caused little or no concern among paper manufacturers and dealers. The slowing down of demand was expected and had it not developed the probabilities are the trade would have worried more than it is now worrying since the market shows those characteristics common for the summer.

Reports generally tell of much activity at paper mill centres. If anything, paper manufacturers are running their plants at present at a better rate of production than usually at this point in the year. This is particularly true as regards the news print and book paper mills. Demand for fine papers and for wrapping, tissue and boards as well as specialties has suffered the most, but even these descriptions of paper are moving in equally as large volume as is ordinarily the case at this period of the year. A pleasing feature of the present situation is that most manufacturers are well supplied with back orders and contracts. Paper consumers earlier in the year did not hesitate to commit themselves freely and a good many placed contracts covering their requirements for an appreciable time ahead, with the result most paper mills are now so well provided with commitments that they are justified in operating at a remarkably good ratio of full output and are not bothered very much with finding an outlet for their production. There have been few cancellations of orders this season, less than normally, no doubt, and manufacturing activity therefore is keeping up at a very satisfactory pace for the summer and seems likely to continue so during the next several months.

The slowing down of business generally can be held responsible for the subsiding of demand for some kinds of paper. Paper is a product used in numerous lines of trade and industry, and it stands to reason that when business in general undergoes a reaction the consumption of paper is bound to be affected. A significant sign is that sentiment in the trade is exceedingly confident. Everyone nearly having any connection with the paper industry looks for a busy autumn and fall. Expectations of banner activity after the usual summer depression are running high, and certainly there are many indications that hopes in this direction are going to be fulfilled. The reaction in various industries during the past several months will doubtless be followed by a rebound of business, which, in conjunction with the customary quickening of trade in the fall, should lead to an active and broad paper market along about September.

Paper prices are holding distinctly steady. No important changes have occurred recently, and the fact that quotations have been fully maintained in the face of decreasing demand would seem to attest to the healthiness of market levels. Manufacturers certainly seem justified in keeping quotations firm. It is true that there has been some decline in raw material costs but manufacturing costs nevertheless are today just as high, if not higher, than at any time in the past year. Wood pulp is resting on a high price level, chemicals are costly, coal is as expensive as ever, and labor is higher. Practically all paper mills have advanced wages of their operatives in the past several months, and, of course, this is the main item in fixing production costs. Moreover, prices of paper are not too high. Compared with any other manufactured product paper is probably cheaper in proportion than all other domestic manufactures, so that manufacturers are perfectly warranted in maintaining their prices over the slack summer season.

That manufacturing activity in the news print industry continues at a brisk pace is shown by the last Federal Trade Commission report. Production of print paper by United States mills in May amounted to 138,868 net tons of total news print, showing a sharp increase over the preceding month, the gain amounting to more than 22,000 tons above the 116,719 net tons produced in April, and comparing with 129,950 net tons produced in May last year, 78,868 tons in May two years ago, and 129,230 tons in May three years ago. In other words, May production of news print ran considerably ahead of that in the same month of 1920 when the memorable boom was on. May output also was no less than 20 per cent above the average monthly production over the past five years.

Production of total news print in the first five months of 1923 amounted to 626,944 net tons, which was the largest amount of print paper ever before produced by United States mills in the same period of time with the single exception of 1920, when production was but slightly in excess of that this year. Comparative figures are as follows: 1922, 562,912 net tons; 1921, 528,678 tons; 1920, 629,244 tons; 1919, 556,245, and 1918, 527,626 tons.

The price tone in news print is firm to an extreme. Most manufacturers are in the happy position of having their output entirely sold on contract for some time ahead, and it is therefore no easy matter for publishers to locate available supplies of standard news for spot shipment. Premiums are frequently being granted for quick deliveries by transient buyers, and even those publishers who thought they had covered their requirements on contract are now and then coming into view as spot buyers looking for additional supplies of paper. Since the leading manufacturers announced they would make no change in prices for the remainder of this year there has been no hesitation about buying, and publishers are not only taking every pound of paper due them on their contracts but are in many cases in want of extra tonnage.

Book papers are fairly active. Transient demand has slowed down somewhat of late but there is a steady movement of good dimensions into consuming channels and most mills are well supplied with orders. It seems safe to say that the book paper plants of the country are running at close to maximum capacity, and they are shipping out their product about as rapidly as it comes from the machines. Prices are steady to firm, with machine finished book quotations displaying a stiffening trend.

Wrappings are seasonably quiet, as are tissues. There is, however, a moderately good demand for these papers, and prices show no alteration. Fine papers are moving in medium quantities and at maintained prices.

The season for expansion of board demand is drawing near but thus far consumers of box boards have been cautious in their buying, evidently being satisfied to keep their direct needs supplied. Quotations have fluctuated to some extent and are generally on a slightly lower level than a month ago, plain chip being quoted in the East down to $55 a ton f. o. b. New York, and filled news board at $57.50. A majority of manufacturers, however, are quoting a little in excess of these figures.

Link-Belt Conducts Sales School

The Link-Belt Company has adopted the policy of holding annual "Sales Schools." The most recent of these schools was held at the Link-Belt Indianapolis factory, June 4th, 5th and 6th. The salesmen, eighteen in number, came from the Detroit, Pittsburgh, Toronto, Chicago, Boston, New York, Kansas City, St. Louis and Dallas offices.

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The tissue mills operated by Robertson Bros., E. C. Robertson & Son and W. F. Robertson & Co., have been purchased by The Robertson Company of Hinsdale, N. H. The Robertson Company will operate these companies as divisions of the parent company under the same management as in the past, with E. C. Robertson as president and W. F. Robertson as treasurer and general manager. Each division will handle its own business as in the past.

The Abitibi Power and Paper Company, Iroquois Falls, Canada, has definitely decided to go ahead with its original plan to complete the Townsite. This plan calls for housing accommodation for all the married employees of the company. The plan also includes the completion of the business block to provide for stores and other buildings.

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Domestic Raw Materials

Papermaking Rags

Easiness has been for sometime past and is still the outstanding characteristic of the papermaking rag market. Prices have moved off in a constant way and the decline does not appear to have yet spent its full force; in other words indications are that market levels will touch lower points before the downtrend is ended, since the undertone is distinctly weak in most quarters and since demand from consumers is at best of very limited dimensions. This is the time of the year when paper mills absorb rag stock, along with other kinds of raw material, in small quantities. Paper manufacturers at present are busy compiling mid-year inventories and making necessary repairs to mill equipment, and they obviously are more concerned over these matters than in augmenting their stocks of raw material. Consequently buying is almost solely against actual and direct requirements, and the orders placed seldom call for other than small lots of rags. Moreover, this is the season when incoming supplies of rags are usually the heaviest as spring collections are moving into grading centres. These factors combined make for a decidedly quiet market and an easy price tone.

The situation, however, is not without its redeeming features. It is but customary for the market to be in its prevailing condition at just this period of the year, and there is little or no doubt that a reaction will take place in due time. Sentiment in the trade is confident; dealers on every hand freely predict a broader demand and higher prices, and unless the trend of the market is different from that which is ordinarily experienced following the early summer dullness and weakness, their predictions will likely be realized.

A bullish factor is that imports of papermaking rags have dropped off during the past several weeks. This means that importers, either having difficulty in finding an outlet for the supply on hand or unable to sell to paper mills at a profit, have stopped shipments from European sources. There are numerous indications that sizeable accumulations of foreign rags are in the hands of importers in New York, Philadelphia and other cities at present, and, from the papermaker's point of view, this offsets in some measure the decline in importations recently, but the fact should not be lost sight of that practically all of these rags held unsold by importers were bought in Europe on a high market and that importers consequently are not likely to dispose of them at prices now prevailing, at least not until they are fully assured that the market is not going to improve its position. Possibly the most bullish factor in the entire rag situation is that prices in Europe hold up on a high level. Dealers there have succeeded in selling about all the supply they have had to sell thus far this year to the United States, and, having small stocks on hand and plenty of capital because of the good business they have transacted with American buyers, are in a more or less independent position and are firmly insisting on stiff prices for any additional supplies of rags. This would appear to mean that if American paper mills are to obtain their usual amounts of rags from Europe they will necessarily have to raise their prices above current levels to be able to buy on the other side of the Atlantic.

Prices have worked down to levels where domestic dealers in numerous cases have curtailed their sorting operations, particularly as regards the better grades of rags. Labor these days is an all-important matter in the rag industry, and dealers claim they cannot profitably sort stock under prevailing market prices. On the other hand, so long as demand continues as slow as it now is there seems small probability of rag prices advancing, and it is customary for paper mills to hold to their policy of hand-to-mouth buying during most of July at least.

New cuttings of all kinds have eased off in price. No. 1 white shirt cuttings are offered to paper mills at 12.25 cents a pound at dealers' shipping points and a few buyers are in evidence at this basis. No. 2 white shirt cuttings are available at 6 cents, fancy shirt cuttings at 5.75 cents, washables at 4.75 cents, light silesias at 8 cents, and blue overall cuttings at 8 cents, with the probabilities favoring buyers securing some supplies at less than these rates. Old whites have declined a little further, and thirds and blues have weakened in price. Roofing rags are down several dollars more per ton. No. 2 roofing stock has sold in the East at one cent per pound at shipping points, though in the West slightly higher prices prevail. No. 1 roofing is relatively firmer owing to the smaller available supply, around 1.30 cents a pound being generally asked. Foreign dark colored cottons are quoted by importers at an average of 1.35 cents per pound ex dock New York but felt paper manufacturers are not inclined to meet this price.

Average quotations f. o. b. shipping points and ex dock are:

New Stock—	New York and Chicago
White shirt cuttings, No. 1	12.25-12.50
White shirt cuttings, No. 2	6.00- 6.25
Fancy shirt cuttings	5.75- 6.00
Washables, No. 1	4.75- 5.00
Unbleached muslins	11.50-11.75
White lawns	11.00-11.25
Overall cuttings, blue	8.00- 8.25
Black silesias	4.75- 5.00
Light flannelettes	10.00-10.25
Canton flannels, bleached	11.00-11.25
Canton flannels, unbleached	9.75-10.00
Shoe cuttings, bleached	9.75-10.00
Shoe cuttings, unbleached	8.00- 8.25
Light silesias	8.00- 8.25
O. D. khaki cuttings	5.00- 5.25
Mixed khaki cuttings	4.25- 4.50
Corduroy cuttings	3.75- 4.00
Cottonade cuttings	3.75- 4.00
Linens, No. 1 white, foreign	14.50-15.50
Light prints, foreign	5.25- 5.50
Old Stock—	
Whites, No. 1, repacked	6.50- 8.00
Whites, No. 2, repacked	4.00- 4.50
Whites, house soiled	2.50- 2.75
Whites, street soiled	2.25- 2.50
Lace curtains	3.75- 4.00
Thirds and blues, rough	1.85- 2.00
Thirds and blues, repacked	2.50- 2.75
Black stockings	3.00- 3.25
Cotton canvas, No. 1	4.00- 4.25
White cotton batting	4.25- 4.50
Roofing, No. 1	1.30- 1.40
Roofing, No. 2	1.10- 1.20
Dark colored cottons, foreign	1.40- 1.50
Blue linens, foreign	3.50- 4.00
Grey linens, foreign	5.50- 6.00
White linens, foreign	9.50-10.50
Light prints, foreign	2.50- 2.75

Rope and Bagging

Current business in old rope and scrap bagging is very characteristic of the season. There is not much demand from paper mills for either material of any grade, and while price changes recently have been slight, such alterations as have occurred have been in a downward direction and the tendency continues off.

The leading paper mill buying organization is almost entirely out of the market for old rope. Other consumers, knowing this, are bidding lower prices and have succeeded in bringing market levels down somewhat in spite of the contentions of dealers that available supplies of old rope are abnormally small and that nowhere near the usual amounts are coming in from the shipping trade and other sources of supply. Domestic manila rope is selling to paper mills at 5.75 to 6 cents per pound at dealers' points and the probabilities are that some papermakers have bought below this price range. Foreign manila rope is quoted at about the same levels as the domestic article but importers are frank to say that they experience difficulty in locating buyers and in securing the prices asked. Strings of most kinds are in relatively better demand than rope, and mixed strings are selling at 1.25 cents a pound or slightly less at shipping points and sisal strings at 2 cents.

No. 1 scrap bagging of the best quality is fetching only around 1.25 cents a pound at dealers' shipping points, and bagging is available at cheaper figures than this. Roofing bagging is quoted at 80 to 90 cents a hundred pounds, and No. 1 domestic gunny bagging at from 1.50 cents a pound upwards.

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F. o. b. shipping point quotations follow:

	New York and Chicago
Gunny, No. 1 domestic	1.50-1.65
Gunny, No. 1 foreign	1.40-1.50
Scrap bagging, No. 1	1.15-1.25
Roofing bagging	.80- .90
Wool tares, heavy	1.50-1.65
Wool tares, light	1.40-1.50
Manila rope, No. 1 foreign	5.75-6.00
Manila rope, No. 1 domestic	5.75-6.00
Sisal strings	2.00-2.10
Mixed strings	1.15-1.25

Old Paper

After having reached lower price levels in the steady decline which lasted almost through June, waste paper of most kinds seems to have steadied, and the market is characterized by a firmer tone than has been evident for a period of two or three months. The steadying process seems due more to the fact that prices worked down to levels where dealers began to curtail collections to such an extent that available supplies were appreciably reduced than to any expansion of buying on the part of consuming mills. There have been instances recently where certain board or paper manufacturers have displayed interest in sizable tonnage of old paper, presumably with a view of laying in a supply while prices are low, but this has been the exception, and aggregate demand today is about as narrow as it has been at any time in the past several months.

Quotations on the low grades seem fairly well stabilized at about 80 cents a hundred pounds, f. o. b. shipping points for folded news, and 70 cents for No. 1 mixed paper in the East, with several dollars a ton more quoted in the West. In fact, some western dealers are reported securing $1 a hundred pounds at shipping points, and even higher, for flat folded news, and relatively as much for mixed paper. Old kraft paper displays a steady price tone at a minimum of about 2 cents per pound for strictly No. 1 packing, while overissue newspapers are firm at 1.10 cents a pound or higher at dealers' points. Shavings are quoted at around 4.25 cents a pound for No. 1 hard white, and between 3.00 and 3.25 cents for No. 1 soft white shavings. Old magazines are quoted at as low as 1.60 cents a pound in the East but much higher prices prevail in the West.

F. o. b. shipping point quotations are:

	New York and Chicago
Hard white shavings, No. 1	4.00-4.35
Hard white shavings, No. 2	3.50-3.75
Soft white shavings	3.00-3.25
Colored shavings	1.75-2.00
Heavy book, No. 1	1.60-1.75
Crumpled book, No. 1	1.40-1.50
Ledger stock	1.75-2.00
Kraft, No. 1	2.00-2.15
Manilas, No. 1	1.10-1.25
White blank news	1.90-2.00
Over-issue news, No. 1	1.10-1.20
Folded news	.80- .90
Mill wrappers	1.00-1.10
Boxboard cuttings	.85- .95
Mixed paper, No. 1	.70- .80
Common paper	.50- .60

Chemical Pulp

There is little other than a routine demand of seasonal dimensions for chemical wood pulp at present. Paper manufacturers seem opposed to buying except to cover actual and immediate requirements, and while a fairly heavy contract movement is in progress and producers are keeping moderately busy against such commitments, current demand is of slight consequence. Consumers are coming into evidence as buyers in a very spotty way and the orders placed seldom involve other than small tonnage, and reports say that most paper mills are finding their contract supplies ample to take care of present needs.

The price tone of chemical pulp, however, is comparatively steady. There is nothing in the market of a sufficiently bullish character to enhance values, yet producers are maintaining quotations and seem to be proceeding on the theory that it is better to curtail output than to flood the market with pulp and "bear" prices. Many on the selling side of the trade anticipate a much stronger market for domestic pulp later in the year. It is believed that the effects of the strike in the pulp mills of Sweden will be felt then and that papermakers will find it necessary to increase their buying of pulp in domestic quarters, but at the same time pulp manufacturers in the United States are not hesitating to book any contracts for forward shipment provided they can obtain reasonably fair

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prices, thereby indicating that they prefer sure business to absorb their production to holding back in selling in anticipation of higher prices.

Bleached sulphite of No. 1 quality is quoted at 5 cents a pound, f. o. b. pulp mills, and prime unbleached sulphite at 3.25 to 3.50 cents, with most quotations on the latter at the higher figure. Kraft pulp of No. 1 grade is selling at close to 3.50 cents a pound in a majority of cases, and producers of soda pulp are reported sold well ahead at prices ranging from 4 to 4.25 cents a pound at pulp mills.

F. o. b. pulp mill quotations follow:

Bleached sulphite	4.75-5.25
Easy bleaching sulphite	3.50-3.75
Unbleached sulphite, No. 1	3.25-3.50
News grade sulphite	3.10-3.30
Soda pulp, bleached	4.00-4.25
Mitscherlich, unbleached	3.50-3.75
Kraft, No. 1	3.25-3.50
Screenings, refined	1.50-1.75

Mechanical Pulp

There is a routine demand of seasonal proportions for mechanical pulp. Consumers show little desire to buy other than in tonnage necessary to cover their direct needs, and grinders apparently are having difficulty in locating an outlet for all the pulp they are producing at present. However, this is the time when producers endeavor to pile up a surplus stock to carry them over the dry spell which usually develops later in the summer, and there is little pressure to market pulp, with the result prices are fairly well maintained.

Domestic grinders quote about $35 a ton on an average at producing plants for prime spruce ground wood, freshly ground for prompt shipment. Reports have been heard of sales at a little under this basis but it is asserted that the bulk of current business is at this price or slightly higher. Ground wood is being sold by Canadian manufacturers at from $32 a ton upwards, quotations depending on the location of mills and the freight involved as well as on the air dry test.

Chemicals

Quotations on casein have eased off a bit further, due to increased supplies from foreign sources and a slowing down of demand from paper mills. About 18 cents a pound, duty paid, is the basis commonly quoted, though purchases at a cent less have been reported. Bleaching powder is steady at around 1.75 cents a pound, and brimstone is quotably firm at $18 to $20 a long ton at mines. Caustic soda displays little or no price change, nor does soda ash. There is a fair call for papermaking chemicals though the movement is mainly against contracts.

Average quotations are as follows:

Alum, lump ammonia	3.25- 3.50
Alum, lump starch	3.75- 4.00
Blanc fixe, powdered	4.00- 4.25
Bleaching powder	1.65- 1.75
Brimstone (long ton, at mine)	18.00-20.00
Casein (duty paid)	17.00-18.00
Caustic soda, spot delivery	2.50- 2.75
China clay, domestic washed	13.00-15.00
China clay, foreign	15.00-22.00
Rosin, grade E	6.10- 6.15
Satin white	1.50- 1.75
Soda ash, 58 per cent light (bags)	1.20- 1.30
Starch, papermakers', in bags	2.80- ....
Talc (ton)	14.00-16.00

Paper box merchants and manufacturers were guests of Herman M. Hess, of Hess & Densen, at a dinner meeting in behalf of the Federation for the Support of Jewish Philanthropic Societies given June 25th at the Metropolis Club, 105 West Fifty-seventh Street. Mr. Hess was host to fourteen leading Jewish paper box manufacturers of New York who discussed the drive for $500,000, which is being conducted by the Business Men's Council to destroy the deficit in the Federation's 1923 budget of four and a half million dollars.

The Marathon Paper Company of Rothschild, Wis., recently bought a large tract of timberland from the Longyear estate at Marquette, Mich. Four hundred twenty-three thousand three hundred two and one-half dollars were paid for the tract which is several miles east of Wakefield, Mich.

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White sulphite	12-30
Colored rag	16-40
Ledger—	
White rag	20-50
White sulphite	14-30
Colored sulphite	15-30
Colored rag	16-50
Bonds—	
White rag	19-45
White sulphite	10-30
Colored sulphite	11-30
Colored rag	18-45
Book—	
No. 1 S. & S. C.	7.00- 7.75
Machine finished	6.75- 7.50
English finished	7.00- 7.75
Coated and enameled	9.00-14.00
Lithograph, M. F.	9.25-14.00
News print—	
Rolls, contract	3.75- 4.00
Rolls, transient	4.00- 4.25
Sheets	4.25- 4.50
Side runs	3.25- 3.50
Cover Stock—	
Coated, both sides	10.25
Coated, one side	10.15
Tissue—	
No. 1 white, 20x30	.85- .95
No. 2 white, 24-36	.75- .85
No. 1 manila, 24-36	.75- .85
Kraft	1.00- 1.25
Wrappings—	
No. 1 Kraft	7.00- 7.50
No. 2 Kraft	6.00- 6.50
Boards—	New York and Chicago
Solid news	65.00-70.00
Straw	60.00-65.00
Plain chip	57.50-60.00
White coated chip	80.00-85.00
Manila coated chip	75.00-80.00
Binders' board	85.00-90.00

From Our Berlin Correspondent

Paper as Tightening Material for Pipes

The ordinary materials for keeping pipe conduits tight, such as hemp, cotton, asbestos, etc., are rather expensive. During the war Germany has learned far more than any other country the science of finding substitutes for any kind of material, for the long blockade cut the nation off from indispensable raw material. Thus numerous experiments have been made in all kinds of trade and even now, several years after the war, constantly new substitutes are appearing for this or that material, for the adverse rate of exchange acts rather prohibitive to employ a number of materials in the way as in pre-war times.

Concerning the above purpose of keeping pipe connections tight, cellulose cannot compete with the other stuffing quoted above, but in many cases it answers the purpose. If the stuff is not exposed to great heat nor in contact with liquids which make it swell, a mixture of ordinary pulp with prepared chalk or ground cork is sufficient. Plates of any desired size are pressed from this paste and built into the conduits, having been dried first, if necessary.

If the caulking seam shall resist any liquids from outside or inside, the ordinary pulp must be first pressed in the shape of blocks, the latter are thoroughly dried and then broken or torn into smaller pieces like flakes. These are then thoroughly mixed with some grease, linseed oil, melted wax or paraffin and thus cannot be attacked by liquids. Such pastes can be worked into cord, plates, strips, etc., and be stored without losing their resisting power against liquids. These substitutes, however, are only applicable with liquids being not hotter than blood temperatures, otherwise they melt.

If they are to be used for hotter liquids, the soft paper flakes must be mixed with a concrete paste and well kneaded, taking care that greasy or resinous impurities are removed, otherwise the mixture will not form a homogeneous mass. An addition of vegetable ash, such as that of cigars, in small quantities is recommended. After a special process, whole tubes have been made of such paper. Strips of the latter saturated with synthetic resin are wrapped around a core with application of pressure and heat. These tubes are distinguished by light weight and resistance against chemical influences. They can be easily worked and are suitable for a number of applications.

Fabrics for Furniture Made of Leather and Paper

Leather and paper, although of different nature, have been employed for the same purposes, such as wall covering, clothing, chair and sofa covers. If we employ them separately they show, notwithstanding their excellent properties, some disadvantages which could be removed if a combination of paper and leather takes place. Certain elastic leather-sorts are used for chairs, but after a short time the upholstering shows unevenness and causes unequal wear. On the other hand paper, even in the shape of tissues, cannot be made so strong as to resist the considerable wear and friction as is the case with chairs. Furniture fabrics of paper are soon worn out, get holes, and must be replaced. Their only advantage is their cheap price.

An invention has been made concerning a combination of paper tissues with leather compounded in such a way that the good properties of the latter, its long wear, is maintained together with those of the paper, viz., its permanence regarding tension longitudinally and transverse. Up to now reindeer leather has been used practically only for gloves owing to its flexibility, while by gluing it firmly to paper tissues it is protected against too strong extension in both directions which makes it useful for furniture covering and many other uses. Tissues are better than plain paper. All kinds of gums and glues are applicable as long as they represent an intimate connection with leather and paper and do not render the material hard. This combination has proved well as furniture covering. Most sorts of leather and paper tissue allow easy sticking and rolling together to a strong fabric. If we glue alternately several layers of leather and paper together and put the whole under strong pressure being rolled, we obtain a very strong artificial leather which can be compared with buffalo leather for durability.

The invention has been made by a Norwegian. Paper tissues are widely used in Germany, which owing to the enormous price of imported cotton uses them for numerous purposes as substitutes of linen, etc.

At the annual congress of the National Safety Council the paper and pulp section will meet October 2, 10 a. m. The following subjects will be discussed:

1. Value of Physical Examinations in Paper and Pulp Mills —Seth L. Bush, Crocker-McElwain Companies, Holyoke, Mass.
2. Safeguarding our Workers—Dr. Hugh P. Baker, secretary American Pulp & Paper Association.
3. The Paper and Pulp Mill Safety Code—discussion led by Robert M. Altman, Marathon Paper Mills Co., chairman Paper and Pulp Code Committee.

(Copies of this proposed National Code, for which the National Safety Council is sponsor, are obtainable from the council on and after September 1.)

4. Round-table on Paper and Pulp Mill Hazards, including (a) Prevention of slipping on wet floors; (b) Safe handling of material.

The Newton Falls Paper Company has opened a general sales office in the Tribune Bldg., 154 Nassau Street, New York City. All correspondence relative to sales will be taken care of at this office.

A. A. Silverton & Company, dealers in paper mill supplies of 200 Fifth Avenue, New York, have incorporated their business under the name of A. A. Silverton & Company, Inc., with a capital stock of $25,000.

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Wood Pulp

The outstanding development in the foreign wood pulp situation is the reported strike of operatives in the pulp and paper mills of Norway which started on June 18, causing all the mills in that country to close down. While it is expected that the labor difficulty will soon be settled and the strike ended, it is understood from the latest cable advices received in New York that some hitches have developed in the negotiations and the pulp mills continue shut down. The workers in the pulp and paper plants have no grievances of their own but went on strike in sympathy with the strike of woodsmen and river workers, and indications are that they will remain out until the employers of the rivermen patch up their differences with their employes. There is the possibility that the strike in the pulp and paper industry may develop into a long drawn out affair similar to the strike in the pulp mills of Sweden earlier this year, in which event there is no doubt that the influence on the world pulp situation would be marked, especially as regards the available supply of bleached sulphite since Norway produces a good part of the world's consumption of this kind of pulp.

Importations of pulp into the United States are on the decline, judging from Government statistics relating to imports during the past several months. April imports, for instance, were smaller than in any month since last September, amounting to 70,401 net tons of chemical pulp from all sources, compared with 82,078 net tons imported in March, 97,589 net tons in February, and 117,182 net tons in January. In fact, April importations were not more than half of the monthly imports during the last three months of 1922, when receipts were running exceptionally heavy. However, it is customary for pulp imports to drop during the first several months of the year since this is the time the Baltic is closed to navigation and shipments from Sweden to the United States materially decline. For that matter, April, 1923, imports were larger than in the same month a year ago, when 65,141 net tons of chemical pulp were imported.

There is not much trade activity current in foreign wood pulp. Demand from paper mills is at best of limited compass. Consumers are evincing fair interest but they are plainly reluctant about buying and are mostly placing orders when pressed by necessity for supplies or when successful in securing pulp at attractive concessions in price. The price tone generally is firm. Importers still contend that higher prices will be seen later in the year, it being felt by them that the effects of the Swedish strike will not be fully noted until along about this fall, and it is argued that if demand from paper mills develops anywhere near the volume expected nothing can prevent values from rising.

At present, however, there are some sellers shading prices. This is the usual thing when the market is in its prevailing state with demand at a very low point, but the fact that occasional sales of certain lots of pulp are being made at price concessions does not disturb the general quotational range. Prices at primary sources are reported high. Manufacturers in Sweden and Norway are said to have but limited amounts of pulp unsold, and it is asserted that they are securing relatively better prices from European consumers than American paper mills are now ready to grant. In other words, it is the contention of importers in New York that if papermakers in this country desire to get their usual supplies of sulphite and kraft from Scandinavian sources this year they will have to meet slightly higher prices at least than now obtain.

Between 4.75 and 5 cents per pound ex dock New York is the price range commonly quoted on prime bleached sulphite of foreign origin, while unbleached sulphite of prime quality is quoted at 3.40 to 3.50 cents ex dock, and easy bleaching sulphite around 3.60 cents. Kraft is firm at about 3.40 cents per pound on the dock, and a strong factor in this kind of pulp is that spot stocks in importers' hands are exceptionally small.

Receipts at the port of New York in June and current market quotations ex dock New York follow:

Bleached sulphite, No. 1	$ 4.50- 5.00
Unbleached sulphite, No. 1	3.35- 3.50
Easy bleaching	3.50- 3.75
Mitscherlich unbleached	3.50- 3.75
Kraft	3.35- 3.50
Ground wood, per ton	40.00-43.00

Lagerloef Trading Co., 3,750 bls. from Helsingfors; Woodpulp Trading Co., 1,620 bls. from Hamburg; Castle & Overton, 7,433 bls. from Bremen and 296 bls. from Rotterdam; E. M. Sergeant & Co., 125 bls. from Greaker and 177 bls. from Gothenburg; International Acceptance Bank, 1,000 bls. from Greaker; Mechanics & Metals National Bank, 1,000 bls. from Greaker; Johaneson, Wales & Sparre, 2,155 bls. from Gothenburg and 1,500 bls. from Sundsvall; M. Gottesman & Co., 3,900 bls. from Bremen and 4,000 bls. from Trieste; Poland Paper Co., 2,652 bls. from Trieste; Tidewater Paper Mills Co., 8,647 bls. ground wood from Point au Ric and 12,344 bls. ground wood from Liverpool, N. S.; Equitable Trust Co., 338 bls. from Rotterdam; National City Bank, 3,300 bls. from Sundsvall; Nilsen, Lyon & Co., 751 bls. from Sundsvall and 300 bls. from Bremen; American Woodpulp Corp., 600 bls. from Bremen; H. Hollesen, 7,595 bls. from Konigsberg; Bulkley, Dunton & Co., 500 bls. from Bremen; Guaranty Trust Co., 586 bls. from Hamburg and 2,000 bls. from Greaker; J. Andersen & Co., 2,310 bls. from Greaker; Scandinavian Pulp Agency, 1,000 bls. from Copenhagen; Order, 1,500 bls. from Sundsvall, 3,400 bls. from Vancouver and 10,260 bls. from Finnish ports.

Paper Stock

There was a falling off of imports of most kinds of papermaking material into the United States in June. The reason for this apparently was the lower prices prevailing and the narrower demand from paper mills. Rag stock came in in moderate amounts but individual shipments did not approximate the volume of the several preceding months, nor were imports of old rope or bagging as large. Prices at European sources are reported to be holding fairly firm, which in conjunction with a falling market here doubtless accounts for the recession in importations.

Arrivals at the port of New York in June follow:

Old Rope

Brown Bros. & Co., 506 coils from Rotterdam, 161 coils from Bristol, 259 coils from Hull, 391 coils and 67 bls. from London, 167 bls. and 36 coils from Antwerp, 69 coils from Newcastle and 23 coils from St. Nazaire; E. J. Keller Company, 122 bls. from Havre, 120 bls. from Dundee and 75 coils from Trieste; Chemical National Bank, 102 coils from Bremen; T. Nevin, 9 coils from London; Castle & Overton, 26 bls. from Venice; International Purchasing Co., 13 bls. from Venice and 82 coils from Rotterdam; Bemis Bro. Bag Co., 29 bls. from Barcelona; Ellerman-Wilson Lines, 106 coils from London and 20 coils from Southampton; American Exchange National Bank, 121 coils from Hamburg; Stone Bros. & Victor Galaup Co., 44 bls. from Havre; Order, 11 bls. from Marseilles, 114 coils from Hamburg and 48 bls. from Bergen.

Old Bagging

G. M. Graves Co., 119 bls. from London; E. J. Keller Co., 164 bls. from Hamburg, 176 bls. from Rotterdam and 88 bls. from Antwerp; S. Silberman Co., 507 bls. from Rotterdam; Waste Material Trading Corp., 96 bls. from Rotterdam; L. H. Abenheimer, 204 bls. from Manchester; Prince & Kennedy, 231 bls. from Dublin; Maurice O'Meara Co., 98 bls. from Antwerp; Coal & Iron National Bank, 65 bls. from Havre; Brown Bros. & Co., 200 bls. from Manchester; British Bank of South America, 162 bls. from Manchester; Order, 55 bls. from Bombay.

Rags

Katzenstein & Keene, 357 bls. from Rotterdam, 132 bls. from Genoa, 262 bls. from London, 42 bls. from Leghorn and 168 bls. from Glasgow; S. Silberman Co., 218 bls. from Hamburg and 318 bls. from Rotterdam; American Woodpulp Corp., 164 bls. from Rotterdam and 11 bls. from Havre; Castle & Overton, 266 bls. from Rotterdam, 1,510 bls. from Bordeaux and 112 bls. from Havre; L. H. Abenheimer, 183 bls. from Rotterdam and 595 bls. from Havre; E. J. Keller Co., 293 bls. from Kobe, 613 bls. from Hamburg and 364 bls. from Rotterdam; Maurice O'Meara Co., 18 bls. from Hamburg; Salomon Bros. & Co., 69 bls. from Hamburg; F. H. Jaffe, 8 bls. from

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Bremen; Stone Bros. & Victor Galaup Co., 955 bls. from Havre and 85 bls. from London; Paul Berlowitz, 272 bls. from Rotterdam; Atlantic Waste Material Co., 20 bls. from London; R. Levine, 11 bls. from Hamburg; Daniel M. Hicks, Inc., 30 bls. from Dunkirk; Wilkinson Bros. & Co., 36 bls. from Rotterdam; United States Lines, 227 bls. from Bremen; R. F. Downing & Co., 78 bls. from Manchester; G. W. Sheldon & Co., 110 bls. from Marseilles; Brown Bros. & Co., 71 bls. from Bristol; North German Lloyd, 134 bls. from Bremen; W. Schall & Co., 272 bls. from Bordeaux and 25 bls. from Antwerp; Goldman, Sachs & Co., 183 bls. from St. Nazaire, 248 bls. from Antwerp and 181 bls. from Rotterdam; Waste Material Trading Corp., 229 bls. from Rotterdam; Bank of the Manhattan Co., 107 bls. from Havre; American Express Co., 43 bls. from Havre; Guaranty Trust Co., 62 bls. from Hamburg and 187 bls. from Venice; Irving Bank-Columbia Trust Co., 52 bls. from Hamburg and 23 bls. from Liverpool; National City Bank, 9 bls. from Marseilles, 7 bls. from Leghorn and 55 bls. from Antwerp; International Acceptance Bank, 210 bls. from Bremen and 177 bls. from Copenhagen; Equitable Trust Co., 137 bls. from Rotterdam and 119 bls. from Bordeaux; First National Bank of Boston, 40 bls. from Kobe, 20 bls. from Leghorn and 38 bls. from Havre; State Bank of New York, 35 bls. from London and 157 bls. from Bremen; Mechanics & Metals National Bank, 659 bls. from Bordeaux, 673 bls. from Trieste and 74 bls. from Manchester; New York Trust Co., 763 bls. from Bordeaux and 227 bls. from Bremen; Bank of New York & Trust Co., 178 bls. from Bordeaux; Chemical National Bank, 604 bls. from Bremen and 971 bls. from Hamburg; Manufacturers Trust Co., 227 bls. from Bremen; Order, 266 bls. from Hamburg, 65 bls. from London, 58 bls. from Marseilles, 43 bls. from Rotterdam, 990 bls. from Havre, 168 bls. from Bordeaux, 74 bls. from Manchester and 78 bls. from Palermo.

Miscellaneous Paper Stock

Equitable Trust Co., 133 bls. from Dundee; Mechanics & Metals National Bank, 52 bls. from London; Salomon Bros. & Co., 320 bls. from Hamburg; Guaranty Trust Co., 90 bls. from Dundee; E. J. Keller Co., 298 bls. from Antwerp and 48 bls. from Hamburg; International Acceptance Bank, 231 bls. from Antwerp and 46 bls. from Glasgow; National City Bank, 311 bls. from Antwerp; American Exchange National Bank, 160 bls. from London; Irving Bank-Columbia Trust Co., 149 bls. from Antwerp; State Bank of New York, 44 bls. from Glasgow; American Trading Co., 22 bls. from Yokohama; Order, 41 bls. from Dundee.

Paper

Judging from the receipts at the port of New York importations of paper into the United States in June were only about normal or a little in excess of normal volume. There were fairly large shipments of wrapping paper from Scandinavian sources and from Germany, but arrivals of this kind of paper at New York for the month were probably less than in the several preceding months. Newsprint arrivals were fairly large, approximately 7,700 rolls being received on steamers discharging at New York. There were usual amounts of cigarette, hanging, filter and drawing papers received. Receipts of paper of all kinds through the port of New York in June follow:

Cigarette

American Tobacco Co., 1,850 cs. from Bordeaux; DeManduit Paper Corp., 602 cs. from St. Nazaire and 28 cs. from Havre; Rose & Frank Co., 275 cs. from Havre; Surbrug Co., 15 cs. from Havre; R. H. Meehan & Co., 4 cs. from Marseilles; Equitable Trust Co., 625 cs. from St. Nazaire; P. J. Schweitzer, 45 cs. from Southampton and 32 cs. from Antwerp; M. Spiegel & Co., 105 cs. from Genoa; Gluckman & Stanch, 9 cs. from Bordeaux; R. J. Reynolds Tobacco Co., 600 cs. from St. Nazaire; Southern Pacific Co., 3 cs. from Havre; Wilkinson Bros. & Co., 5 cs. from Havre; Order, 40 cs. from Havre and 25 cs. from Marseilles.

Printing

Perry, Ryer & Co., 160 cs. from Glasgow; Parsons & Whittemore, 372 rolls from Helsingfors and 1,205 rolls from Bremen; C. Steiner, 39 cs. from Hamburg and 24 cs. from Bremen; P. C. Zuhlke, 64 cs. from Hamburg; J. L. N. Smythe, 3 cs. from Rotterdam; B. F. Drakenfeld & Co., 36 cs. from Liverpool; Newsprint Paper Corp., 183 rolls from Gothenburg; Globe Shipping Co., 50 cs. from Hamburg; American Exchange National Bank, 40 rolls from Christiania; Corn Exchange National Bank, 418 rolls from Hamburg; Ladenburg, Thalman & Co., 457 rolls from Hamburg; New York Journal of Commerce, 115 rolls from Antwerp; Bulkley, Dunton & Co., 20 rolls from Antwerp; H. Reeve Angel & Co., 941 rolls from

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Wrapping

C. Steiner, 53 bls. from Bremen and 6 bls. from Hamburg; American Mills Co., 67 bls. from Rotterdam; Colombian Steamship Co., 437 bls. from Rotterdam; International Acceptance Bank, 925 bls. from Trondhjem, 809 rolls and 484 bls. from Copenhagen, 101 bls. from Trieste and 2,062 bls. from Bremen; Republic Bag & Paper Co., 86 bls. from Rotterdam, 601 rolls and 64 bls. from Hamburg; Blauvelt-Wiley Paper Mfg. Co., 74 bls. from Glasgow; Chemical National Bank, 2,065 rolls and 101 bls. from Gothenburg and 2,696 rolls from Hamburg; Corn Exchange National Bank, 3,984 rolls and 173 bls. from Gothenburg; H. Fishman Paper Co., 871 rolls from Gothenburg; M. M. Cohen, 60 rolls and 16 bls. from Gothenburg; Public National Bank, 3,767 rolls and 6,486 bls. from Hamburg; Fernstrom Paper Co., 302 rolls and 100 bls. from Hamburg; Chase National Bank, 20 rolls and 30 bls. from Hamburg; Mitchell & William, 1,411 bls. and 155 rolls from Trieste; Ladenburg, Thalman & Co., 615 bls. from Trieste; Wilkinson Bros. & Co., 2,374 rolls and 267 bls. from Rotterdam, 201 bls. from Hamburg and 1,162 rolls and 563 bls. from Bremen; Equitable Trust Co., 488 bls. from Harnosand and 960 rolls and 323 bls. from Bremen; E. Dietzgen & Co., 23 cs. from Hamburg; Maurice O'Mears Co., 1,307 rolls and 1,021 bls. from Hamburg and 4,710 rolls from Gothenburg; National City Bank, 278 bls. from Hamburg and 142 rolls and 5 bls. from Gothenburg; C. G. Keferstein, 290 bls. from Bremen; Reitman, Pilcer & Co., 19 rolls from Hamburg; Hensel, Bruckman & Lorbacher, 22 cs. from Hamburg; J. P. Moors & Co., 321 rolls and 298 bls. from Trieste; Melby, Kuttroff & Co., 112 rolls and 6 bls. from Trondhjem and 249 rolls from Copenhagen; Irving Bank-Columbia Trust Co., 11 rolls and 62 bls. from Hamburg; Order, 7,000 rolls and 515 bls. from Rotterdam, 591 bls. from Gothenburg, 776 rolls and 293 bls. from Bremen, 1,500 rolls from Libau, 343 bls. from Antwerp, 136 rolls and 379 bls. from Hamburg and 741 bls. from Copenhagen.

Writing

C. Steiner, 5 cs. from Bremen; American Express Co., 2 cs. from Southampton; J. W. Hampton, Jr., & Co., 29 cs. from Bremen.

Drawing

E. Dietzgen & Co., 17 cs. from Hamburg and 41 cs. from Marseilles; Favor Ruhl & Co., 9 cs. from Havre; Keuffel & Esser Co., 8 cs. from Liverpool, 137 cs. and 122 rolls from Hamburg and 9 cs. from Rotterdam; H. Reeve Angel & Co., 2 cs. from London; Order, 1 cs. from London.

Filter

E. Fougera & Co., 82 cs. from Bordeaux; H. Reeve Angel & Co., 3 cs. from Southampton and 25 cs. from London; R. U. Delapenha & Co., 3 cs. from Marseilles; Bernard Judae & Co., 21 bls. from Bordeaux and 3 cs. from Gothenburg; Orbis Products Trading Co., 20 bls. from Bordeaux; J. Manheimer, 100 bls. from Southampton; Atlantic Forwarding Co., 3 cs. from Havre; O. A. Brown & Co., 12 cs. from Havre; Order, 3 cs. from Rotterdam.

Tissue

Meadows, Wye & Co., 4 cs. from Liverpool; F. C. Strype, 15 cs. from Liverpool and 2 cs. from Marseilles; Iwai & Co., 7 cs. from Kobe; Meagher-Devoy Shipping Co., 10 cs. from Liverpool.

Photo

Globe Shipping Co., 172 cs. from Bremen; Gevaert Co. of America, 18 cs. from Antwerp; American Shipping Co., 3 cs. from Rotterdam; M. G. Lange & Co., 10 cs. from Bremen.

Hanging

W. H. S. Lloyd & Co., 122 bls. from London and 18 bls. from Liverpool; R. F. Downing & Co., 37 cs. from Yokohama and 4

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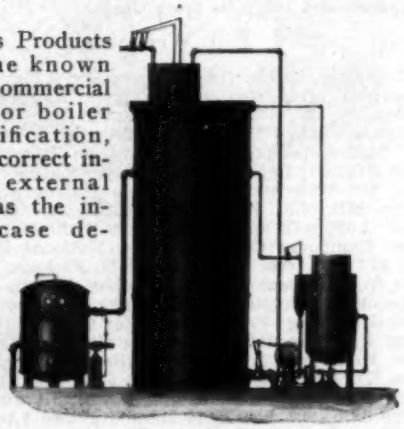

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Board

Bendis Paper Co., 151 bls. from Hamburg; Metropolitan Import & Mfg. Co., 204 cs. from Hamburg; Pulp and Paper Trading Co., 171 rolls from Rotterdam; Cincinnati Milling Device Co., 110 rolls from Rotterdam; F. S. Freed, 4 cs. from Hamburg; Buschmann Bros., 61 rolls from Bremen and 84 rolls from Rotterdam; Happel & McAvoy, 10 cs. from Havre; American Express Co., 4 cs. from Hamburg; Harriet Hubbard Ayres, 5 cs. from Havre; Knauth, Nachod & Kuhne, 35 cs. from Bremen; C. Steiner, 33 cs. from Bremen; Alpers & Mott, 35 cs. from Bremen; A. Bourjois & Co., 33 cs. from Havre; Irving Bank-Columbia Trust Co., 92 rolls from Hamburg; Coty, Inc., 49 cs. from Havre; Order, 26 cs. from Hamburg and 400 bls. from Rotterdam.

Miscellaneous

Whiting-Patterson Paper Co., 28 cs. from Havre; Einstein & Co., 3 cs. from Havre; F. L. Kraemer & Co., 21 cs. from London; McKinley & Co., 20 cs. from Hong Kong; Defiance Mfg. Co., 6 cs. from Marseilles; Japan Paper Co., 154 cs. from Genoa, 5 cs. from Gothenburg and 60 cs. from Yokohama; Birm & Wachenheim, 44 cs. from Havre and 20 cs. from Southampton; American Joint Distributing Committee, 22 cs. from Danzig; A. S. Bitter & Co., 2 cs. from Hamburg; Lord & Taylor, 14 cs. from Havre; R. F. Downing & Co., 2 cs. from Havre; W. L. Bane & Co., 2 cs. from Havre; Coenca-Morrison Co., 3 cs. from Havre; P. H. Petry & Co., 14 cs. from Hamburg; Hensel, Bruckman & Lorbacher, 22 cs. from Hamburg; H. Reeve Angel & Co., 5 cs. from Gothenburg; A. Frankan & Co., 4 cs. from Bremen; Borden & Riley Paper Co., 5 cs. from Antwerp; F. B. Vandegrift & Co., 3 cs. from Hamburg; Independent Forwarding Co., 10 cs. from Havre; Baldwin Shipping Co., 3 cs. from Hamburg; Second National Bank of Hoboken, 5 cs. from Hamburg; Continental Shipping Corp., 31 bls. from Hamburg; H. Brockelbank, 22 bls. from London; E. Daiber, 7 cs. from Antwerp; Irving Bank-Columbia Trust Co., 86 rolls from Antwerp; Ault & Wiborg, 5 cs. from Canton; J. H. & G. B. Siebold, 25 cs. from Canton; Judson Freight Forwarding Co., 3 cs. from Havre.

Trade Associations and the Law

BY T. J. BURKE, C. A.

Sec.-Treas.—Cost Association of the Paper Industry

THE United States Supreme Court's decision that the Armstrong Bureau of Related Industries is in violation of the Sherman Law in the case of the United States against the American Linseed Oil Company, has been recently handed down. This opinion reverses the Lower Court, and orders that Court to issue an injunction restraining the Bureau from carrying on its former activities.

This opinion has been awaited for some time. The Armstrong Bureau deals to some extent with cost work, and has only recently made arrangements with manufacturers in one branch of the industry, and was in process of making similar arrangements with the manufacturers in another branch of the industry to carry on activities similar to those which it has been carrying on for the linseed manufacturers; this, in spite of the fact that efforts were made by the trade associations interested, to prevent these manufacturers from making such arrangements. It can easily be understood, therefore, under these circumstances that statements, such as the following, are misleading, at least, in the case of this industry:

"The United States Supreme Court in deciding that the Armstrong Bureau of Related Industries is in violation of the Sherman Law, in the case of the United States against the Linseed Oil Company, thereby made another decision against trade associations, upholding the Court's former attitude in the case of the American Column & Lumber Company."

The point to which attention is particularly drawn, is that, the Armstrong Bureau of Related Industries is not in fact a "Trade Association" in the usually accepted meaning of that term. A "Trade Association" is a co-operative undertaking, supported by members to promote their business interests in every possible legal way, but is not operated for the profit of anybody except its members. On the other hand, the Armstrong Bureau of Related Industries is an independent bureau which appears to be operated for the profit of those connected

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A shop instrument for determining the density of rubber in accordance with a standard scale. Can be used in conjunction with a plastometer as its reading multiplied by two will give the plastometer reading. This is a rugged scientific instrument designed for use in the mill as well as the laboratory, and although it was primarily designed for testing rubber rolls, it may be used for testing any other rubber articles. It is suitable for testing rubber rolls in place in the machine in which they are used.

Send for Bulletin No. 124

STOWE & WOODWARD CO. The Rubber Roll Makers
Newton Upper Falls, Mass., U. S. A.

with the bureau. The fees charged, apparently, are in most cases considerably in excess of those paid to ordinary "Trade Associations."

The Cost Association welcomes the Supreme Court's decision. It clarifies the atmosphere, and should act as a strong deterrent to those who may be endeavoring to do more than it is legally possible to do.

The Cost Association's Executive Committee has followed carefully the various decisions handed down, relative to trade associations and the promoting of the use of correct cost accounting and general accounting systems. Had the Cost Association been willing to go to the limits to which the Armstrong Bureau of Related Industries has stated it was prepared to go, it could have greatly increased its membership and the work which that bureau did for its members could have been done it is believed, at a cost considerably below the price charged by that bureau.

Manufacturers in the pulp and paper industry are earnestly requested to read this decision carefully, remembering the difference already pointed out between the Bureau and what is generally understood by the term "Trade Association."

The Cost Association has not only kept within the letter of the law, but is keeping well within the spirit of the law. It is working with the Government, as is witnessed by the assistance given to the Department of Commerce in the preparation of the material for its chapter on cost accounting, included in the book on "Trade Associations," recently published by that department.

The Question of Lumber

The following article emanates from the New York State College of Forestry, Syracuse University Extension Service:

The recent rapid increase in the cost of lumber is shown by the record of wholesale prices extending over various periods since 1840. The wholesale price of lumber from 1840 to 1860 was $10.50 a thousand feet. Between 1866 and 1900 it was $16. Between 1900 and 1914 $25 and in 1920 $75. Freights increased 100% and wholesale prices 200% since 1915. This inflation is due to many reasons, chiefly to the exhaustion of supply which has resulted in long hauls and expensive operations in regions difficult of access.

Timber was first taken from localities nearest the markets. As that source was exhausted the transportation distances became longer and the timber regions were confined, in many cases, to a more rugged country, so the cost of production has been forced higher and higher.

This is strikingly shown by the way lumber outstripped all other commodity prices in the purchasing power of the dollar. Before the Civil War the increase of lumber prices kept on an even basis with the average increase in other commodities. but after that lumber prices jumped.

The difference between lumber and other commodities for the period between 1870 and 1900, average about 70% higher for lumber. After the Eastern pine had been exhausted, values of lumber over all commodities had increased 140% The dollar of 1915 purchased about as much of all commodities as it did in 1840, but it required $2.34 in 1915 to purchase as much lumber as did one dollar in 1840 and lumber that could be purchased in 1840 for $100 cost $510 in 1921, while according to the investigations of E. H. Clapp of the Forest Service, all commodities which cost $100 in 1840 could be bought for about $143 in 1921.

The rapid increase in the cost of wood to consumers is bound to continue, because nothing is being done to adequately relieve the situation, and it will be a long time after remedial measures are initiated before relief will be felt. No business activity can be carried on without being affected directly or indirectly by the price of wood. Lumber is therefore an important factor in the cost of living and as long as we are willing to remain inactive in reforesting on a large scale, the longer and more severe will be the drain on the pocketbooks of the people.

The Black-Clawson Company, Hamilton, Ohio, has now in transit a 122 inch, 4 cylinder, roofing and board machine via rail and water to the Pioneer Paper Company at Los Angeles, Calif. They also have under construction at the Bogalusa Paper Company a 164 inch Fourdrinier for Kraft. This machine will be equipped with Harland sectionalized motor driven equipment.

The Lindsay Wire Weaving Company, Cleveland, Ohio, is at this time building a 2-story plant with an aggregate floor space of 20,000 feet. In this addition will be new looms, stitching and stretching department and the general offices of the company. Occupancy is expected about September first.

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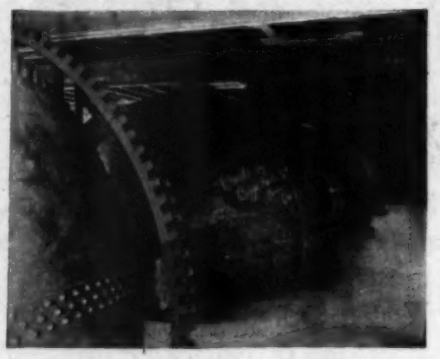

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